E/CONF.39/D/128
24 Oct.1962
ORIGINAL : ESPAÑOL

CONFERENCIA DE LAS NACIONES UNIDAS
SOBRE LA APLICACION DE LA CIENCIA Y LA TECNOLOGIA
EN BENEFICIO DE LAS REGIONES MENOS DESARROLLADAS

Punto del programa : D.11

España

LOS FERTILIZANTES NITROGENADOS EN ESPAÑA
DESARROLLO DE SU INDUSTRIA A PARTIR DE 1940

Por Jaime de CAZTELU y JACOME,
Ingeniero del Ministerio de Industria,

Cecilio RUIZ CASTILLEJOS,
Ingeniero Director de "Sociedad Ibérica del Nitrogeno"

Alberto OYARZABAL y VELARDE,
Ingeniero Director de "Fertilizantes Nitrogenados S.A."

Las monografías presentadas en la Conferencia de las Naciones Unidas sobre la Aplicación de la Ciencia y la Tecnología en Beneficio de las Regiones Menos Desarrolladas constituyen documentos de trabajo de dicha Conferencia. Se publican tal como han sido presentadadas por los colaboradores y los puntos de vista expresados en ellas corresponden a los colaboradores. (Veánse notas al dorso.)

NOTAS

1. Las monografías seleccionadas para las Sesiones Generales serán distribuidas en la Conferencia en los siguientes idiomas oficiales de las Naciones Unidas: español, francés, inglés y ruso.

2. Las monografías seleccionadas para las Sesiones Especiales serán distribuidas en la Conferencia únicamente en uno de los idiomas oficiales antes indicados.

3. Los resúmenes de las monografías presentadas por los colaboradores serán distribuidos en la Conferencia en los siguientes idiomas oficiales de las Naciones Unidas: español, francés, inglés y ruso.

4. No se procederá a la distribución general de las monografías y resúmenes con antelación a la Conferencia. Unicamente serán publicadas en cantidades limitadas con antelación a la Conferencia para uso exclusivo de las delegaciones de los gobiernos participantes y de otros participantes autorizados. La publicación con posterioridad a la Conferencia y la distribución general de las actas y debates de la Conferencia seguirán las prácticas de las Naciones Unidas establecidds por ia Junta de Publicaciones de las Naciones Unidas.

N° 1394
D.11

LOS FERTILIZANTES NITROGENADOS EN ESPAÑA

DESARROLLO DE SU INDUSTRIA A PARTIR DE 1.940

por

Jaime de Gaztelu y Jácome. Ingeniero del Ministerio de Industria.
Cecilio Ruiz Castillejos. Ingeniero Director de "Sociedad Iberica del Nitrogeno".
Alberto Oyarzabal y Velarde. Ingeniero Director de "Fertilizantes Nitrogenados SA"

---

1. SITUACION DE LOS FERTILIZANTES NITROGENADOS HASTA 1940.

a) Iniciación de la industria española.

Se inicia la industria del nitrógeno en España en 1913, con un proyecto de fábrica, por el procedimiento del arco eléctrico.No llegó a realizarse a causa de la I Guerra europea.

En los años 1918 y 1923 se crearon dos nuevas Sociedades, para la fabricación de estos abonos; una por electrolisis y otra para la utilización de los gases de hornos de coque. Estas Sociedades subsisten actualmente.

Existieron otros proyectos é iniciativas, que no pudieron llegar a ser realidad por la anormal situación existente en el mercado de abonos nitrogenados.

Los paises europeos productores de abonos nitrogenados, vendían sus excedentes de producción practicando el "dumping" en los precios; los abonos nitrogenados procedentes de esos paises europeos (Alemania, Belgica, Gran Bretaña, Holanda, Polonia, etc.) se vendían al agricultor español al 60% del precio que se practicaba en el interior de los países productores, a pesar del transporte que tenía que realizarse. En aquellos años, España practicaba las normas de un comercio exterior completamente libre, sin restricciones para la importación, ni establecer derechos de Aduanas que eran prácticamente nulos. Los paises europeos, impusieron en sus territorios restricciones a la importación, que la hacian prohibitiva, y además aplicaban simultaneamente elevadísimos derechos de Aduanas. En esas condiciones, se desarrolló fuertemente la industria de los nitrogenados en esos países europeos, y se asfixiaron las iniciativas españolas, como consecuencia de haber practicado los productores europeos normas de comercio irregular o desleal.

b) Abastecimiento del mercado.

Por las causas señaladas, el abastecimiento del mercado español, dependía practicamente en su totalidad de las importaciones. Es-

to fue causa de muy graves trastornos a la Economía española, pues influía grandemente en su balanza comercial, y despues a partir de 1939, año en que se inció la II Guerra europea, careció de los abonos nitrogenados que requeria su Agricultura.

El consumo español, se fue desarrollando grandemente desde el año 1920. Como cifras indicativas de este desarrollo del consumo, se señalan a continuación las cifras de promedios anuales en cada uno de los tres quinquenios de mercado normal, desde 1920.

Años.	Consumo promedio anual
1920-1925	200.000 Tm. de abonos/año.
1926-1930	350.000 » » »
1931-1935	500.000 » » »

Durante esos años el consumo de los tipos de abonos nitrogenados conocidos entonces según la función del nitrogeno contenido, era: abonos de función nítrica (Nitratos de Chile y de cal), 30% del total, en unidades de N; abonos de función amoniacal (sulfato amonico) 70% del total, en unidades de N.

2. MEDIDAS OFICIALES ADOPTADAS PARA DESARROLLAR LA INDUSTRIA DE LOS FERTILIZANTES NITROGENADOS.

a) Principales Leyes y Decretos establecidos y sus orientaciones.

Las Leyes promulgadas vigentes son las de 24 de Octubre de 1939, la del 24 de Noviembre de 1939 y la del 15 de Mayo de 1945.

Los Decretos generales más directamente relacionados con la Industria del nitrogeno, son los del 10 de Febrero de 1940. Como complemento de estos pueden citarse el de 14 de Marzo de 1947, el de 20 de Julio de 1954 y el de 29 de Abril de 1955; asimismo la sentencia del Tribunal Supremo de Justicia de fecha 3 de Julio de 1951.

La orientación más señalada de la legislación existente para facilitar la instalación de las plantas para la fabricación de fertilizantes nitrogenados, es la de conceder el Gobierno determinados beneficios fiscales a las Empresas, como son los de:

- Reducción de los impuestos hasta un máximo del 50%, durante 15 años.
- Rebaja de las tarifas de Aduanas en la importación de la maquinaria y utillaje de sus instalaciones, cuando éstas no se produzcan en España.

Además de estos beneficios fiscales, se pueden conceder tambien:

- Derecho de aplicar la legislación vigente sobre expropiación forzosa para los terrenos necesarios para la creación de la factoria.
- En determinados casos, la concesión de la garantía del Estado para dar al capital invertido un dividendo hasta el máximo del 4% anual. Para aplicar esta facultad, se requieren requisitos especiales.

Como contrapartida de estas concesiones, se imponen a las empre-

sas otras limitaciones é intervenciones.

b) Plan del Nitrogeno.

Una gran parte del territorio nacional español, posee condiciones naturales extraordinariamente favorables para el desarrollo floreciente de la riqueza agrícola. La aplicación de las técnicas modernas a la agricultura española, progresa de un modo constante; además, cada vez es mayor la necesidad de conseguir obtener mayores rendimientos por unidad de superficie cultivada en las explotaciones agrícolas. Como consecuencia, el consumo de fertilizantes es creciente en la Agricultura española.

El abastecimiento del mercado dependía de la importación; esto producía una carga excesiva en la balanza comercial y además un peligro que se venía sufriendo desde 1939, de no disponer de las cantidades necesarias para nuestra Agriuclture. La experiencia sufrida desde 1939 ha demostrado ampliamente la perjudicial situación existente para la Agricultura española, que resultaba por no disponer de una industria productora de abonos nitrogenados en el país.

El Ministerio de Industria estudió el Plan para el desarrollo de la industria del Nitrógeno en España; se utilizarian materias primas existentes en España: gases de hornos de coque, carbones, piritas, energía eléctrica, etc. Como cantidades a producir se preveía como punto de partida cubrir las necesidades existentes hasta el momento, y despues satisfacer la demanda correspondiente al futuro desarrollo en el incremento del consumo.

Se condedían a las empresas constituidas o que se dreasen, las facilidades establecidas en la legislación, y que antes se han señalado. (2-a).

3. DESARROLLO OBTENIDO A CONSECUENCIA DE LAS MEDIDAS ADOPTADAS.

a) Iniciativas plantedas.

A partir de 1940 se han desarrollado múltiples iniciativas. Actualmente la capacidad de fijación de N autorizada se eleva a la cifra de 560.000 Tm. de N/año; parte de estas instalaciones están actualmente en montaje.

Las primeras iniciativas datan del mismo año 1940; entre este año y el siguiente se autoriza la aplicación de los beneficios señalados, á 5 empresas. En los momentos actuales son 12 las empresas existentes para la producción de abonos nitrogenados en España, por síntesis del amoníaco.

b) Etapas de desarrollo.

La ejecución de las instalaciones autorizadas en 1940 y 1941, comenzó inmediatamente; pero la situación que atravesaban los otros países europeos a causa del desarrollo de la guerra, y lo mismo los Estados Unidos, fueron causa de que no pudieran realizarse en los plazos previstos; esta situación se fué agravando en el transcurso de los años por el desarrollo y vicisitudes de la guerra hasta 1945, y aún los años siguientes dada la situación de destrucción en que habian quedado gran parte de los paises europeos. Las entregas de los equipos industriales especiales, no se realizaron en los plazos previstos, retrasándose varios años la posibi-

lidad de realizar las instalaciones. Las primeras factorias que quedaron terminadas, lo fueron en el año 1949. A partir de 1950 comenzó la producción de las nuevas factorias, a partir de cuya fecha la producción nacional española de abonos nitrogenados ha ido en aumento constante. El aumento registrado en la producción puede deducirse de las cifras siguientes:

1950	1955	1960	1961
17.044 Tm.	212.685 Tm.	453.991 Tm.	620.658 Tm.

La capacidad de fijación de Nitrogeno, en funcionaminto en este año, es de 171.000 Tm. de N/año. El proximo año de 1963 se elevara á 286.000 Tm. de N/año. En un plazo de tres años será del orden de las 500.000 Tm. N/año.

4. UBICACION DE LAS FACTORIAS, MATERIAS PRIMAS. ZONAS DE CONSUMO.

a) Ubicación de las distintas factorias.

En el "Plan del Nitrógeno" se planteó la ubicación de las diversas factorias que habían de desarrollarse en función de:

- proximidad de las materias primas a utilizar.
- proximidad de las zonas de consumo.

La utilización de los gases de coquerias o la de los lignitos como materia prima obligaba, por razón de transporte, a instalar las factorias productoras de abonos nitrogenados lo más próximo a estos centros y lugares de producción de esas naterias primas. Las factorías que se instalasen para obtener hidrogeno por el método de electrolísis, se situaban en las zonas en donde además de tener suficiente cantidad disponible de energía eléctrica al precio conveniente, estuvieran situadas en zonas de gran consumo de abonos nitrogenados.

Posteriormente a haber establecido aquel Plan del Nitrógeno, los sucesivos progresos de las técnicas con la más económica utilización posible de otras materias primas, como han sido los combustibles liquidos, se ha evolucionado hacia el empleo de los mismos, modificando, en consecuencia, los criterios inicialmente establecidos sobre la ubicación de las nuevas factorías.

La distribución del emplazamiento de las distintas factorías de fertilizantes nitrogenados, está resuelta de manera que se facilite el abastecimiento de las necesidades de las distintas zonas de consumo, con los menores gastos posibles en el transporte; y además, por si llegase el momento de tener que efectuar exportaciones de excedentes, ésta se pueda realizar facilmente desde las factorías situadas en puertos de las distintas zonas del litoral.

En la zona del litoral del N y NO, se encuentra actualmente con 5 factorías; 3 en funcionamiento y 2 en montaje. En Vizcaya, importante centro siderúrgico español, hay una factoria que utiliza los gases de coquerias. En Asturias, principal cuenca carbonifera española é importante centro siderurgico, existen dos factorías, una de ellas en montaje; utilizan gases de coquerias y gas de agua. En la Coruña, hay otras dos factorías, una de ellas en montaje -

que utilizará bombustibles líquidos de la nueva refineria de petroleo que se está instalando; la otra emplea los yacimientos de lignitos existentes en abundancia muy próximos a la factoría.

En la Costa del Mediterraneo, está instalada la factoria situada en Cartagena, que forma parte del conjunto industrial de la refineria de crudos de petróleo. En Málaga se está realizando el montaje de una nueva factoría, que utilizará tambien combustibles líquidos como materia prima. En Tarragona, zona de consumo, existen otras dos factorias de abonos nitrogenados, siendo pequeña la capacidad de producción de cada una de ellas.

En Sevilla está instalada ora factoría, cuya materia prima son los combustibles líquidos; está emplazada en zona de gran consumo. En Huelva y en Castilla se montarán instalaciones para producir abonos nitrogenados con el amoniaco obtenido en la nueva factoria de La Coruña,

En el interior de la Península hay dos factorias importantes: una en la parte N, de Valladolid, y la otra en la mitad S, en Ciudad Real; la primera obtiene el hidrógeno por el sistema de electrolisis y por gasificación de antracitas de las cuencas de Palencia y León, próximas a su emplazamiento; pero las sustituye por el empleo de combustibles líquidos. La factoría de Ciudad Real, utiliza como materia prima la antracita de la cuenca en que está emplazada la propia fábrica; forma parte de un gran complejo industrial, que - actualmente está instalando una importante refineria de crudo de petróleos, cuyos derivados empleará para la fabricación de nitrogenados. Está autorizada otra factoria en Zaragoza, que utilizará como materia prima los lignitos de esa zona.

Además, en la provincia de Huesca, en el Pirineo Aragonés, está - situada otra fabrica de productos químicos, entre los que figura el sulfato amónico, utiliza el proceso de electrolisis, siendo esta empresa una importante productora de energia hidroeléctrica.

Otra factoría está situada en las Islas Canarias, que utiliza combustibles liquidos como materia prima.

La cianamida cálcica se fabrica en dos factorías: una en Sabtander y otra en Huesca.

b) Materias primas; razones de su empleo; porcentaje y evolución de su utilización y nuevas materias primas empleadas (combustibles - liquidos). Piritas.-

Para la fabricación de los abonos nitrogenados todas las factorías utilizan el procedimiento de la síntesis del amoniaco; por lo tanto, las materias primas principales son el Nitrógeno y el Hidrógeno; otras materias son las piritas, para la fabricación del sulfúrico, calizas etc.

El nitrogeno se separa del aire atmosférico por los procedimientos normales de destilación.

La obtención del hidrógeno necesario y a los costes más convenientes, es el principal aspecto a considerar.

Como antes se ha indicado, al estudiar el Plan del Nitrogeno, se - inició con la obtención del Hidrogeno partiendo como materia prima

de uno de los tres grupos siguientes:

- Gases de coquerias.
- Gasificación de comoustibles sólidos.
- Electrolisis.

Cualquiera de estos tres procedimientos podría utilizarse por haber en España disponibilidades suficientes para ello. En el apartado anterior a) se señalaban las diversas factorias existentes o en montaje, y las materias primas utilizadas en cada una de ellas.

Las factorias primeramente instaladas partieron de la utilización de las materias primas establecidas en el inicial Plan del Nitrogeno. Como queda antes señalado, al desarrollarse la tecnica de la utilización de los combustibles liquidos, las nuevas factorias proyectadas se basaron en esta materia prima y varias de las antiguas evolucionan hacia el empleo tambien de estos combustibles líquidos.

Las fábricas de cianamida cálcica, parten del carburo de calcio.

España es un país de abundantes yacimientos de piritas.

Las cantidades de abonos nitrogenados obtenidos en cada uno de los años del ultimo quinquenio transcurrido (1957-1961) según la materia prima de que se partió, han sido las siguientes:

Unidad: Tm. de N fijadas.

MATERIAS	Años				
	1957	1958	1959	1960	1961
COMBUSTIBLES SOLIDOS	5.479	5.176	14.308	34.134	46.855
COMBUSTIBLES LIQUIDOS	-.---	-.---	---	- ---	20.120
GAS HORNOS COQUE	23.276	28.431	34.307	37.998	39.615
ELECTROLISIS	13.447	14.055	12.833	11.167	9.935
VARIOS (Cianamida:recuperación)	6.073	6.287	7.353	10.328	11.543
Total:	48.275	53.949	68.806	93.627	128.068

Los porcentajes que representan estas cantidades sobre la total producción de cada año son las siguientes:

MATERIAS	8 1957	1958	1959	1960	1961
COMBUSTIBLES SOLIDOS	11'4	9'6	20'8	36'5	36'6
COMBUSTIBLES LIQUIDOS	--	--	--	--	15'7
GAS HORNOS COQUE	48'2	52'7	49'9	40'6	30'9
ELECTROLISIS	27'8	26'1	18'7	11'9	7'8
VARIOS (Cianamida;recuperación)	12'6	11'6	10'6	11'0	9'0
Total:	100'0	100'0	100'0	100'0	100'0

c) Zonas de consumo.

El consumo de abonos nitrogenados se está desarrollando intensamente; el consumo total en el año 1956 fué de 177.662 Tm. de N y en el año 1961 ha sido de 303.926 Tm. de N. Una serie de acertadas medidas de los Organismos del Gobierno unido a unas intensas campañas de divulgación realizadas por los fabricantes españoles, se traducen en un constante aumento del consumo agrícola de los abonos nitrogenados.

Esta evolución en el consumo total, es reflejo de la variación en el aumento del consumo en las diversas zonas del país.

La zona de mayor consumo habia sido la del Levante español; ó sea, el litoral del Mediterraneo; mayor consumo por unidad de superficie cultivada y mayor consumo total.

El Valle del Ebro y parte del Guadalquivir eran tambien zonas de importante consumo. Asimismo las zonas dedicadas al cultivo de la remolacha.

En las extensas zonas de secano, el consumo era de abonos nítricos exclusivamente, utilizados en la Primavera.

Actualmente el consumo,como ya se indica se ha extendido y se ha intensificado en las diversas zonas. Los nuevos regadíos, la intensificación del abonado de cereales, la extensión de nuevos cultivos, etc.

En los últimos años, el consumo total de la Península y Canarias, se distribuye en los siguientes porcentajes, según las zonas de consumo principales.

Zonas de consumo	Porcentajes.
Galicia.	1'04 %
Cantábrico.	1'03 %
Aragón y Valle del Ebro.	15'41 %
Levante	34'00 %
Andalucia.	18'31 %
Extremadura	3'30 %
Meseta Sur	4'22 %
Meseta Norte	18'12 %
Canarias.	4'50 %
	99'93 %

d) Tipos de abonos nitrogenados obtenidos: su evolución.

Se obtienen abonos simples siguientes:

Tipo	S Producto	Riqueza en N
Amoniacal	Sulfato amónico	20-21 %
Amonítrico	Nitrato amónico cálcico	20,5 %
Amídico	Cianamida de cal	20.5 %

El nitrosulfato amónico se proyecta producir el nitrato amónico

cálcico del 26 %.

En las fábricas en construcción se producirá un abono complejo binario, el fosfato amónico y la evolución natural será hacia un mayor surtido de tipos y hacia mayor número de complejos binarios y ternarios. El empleo de abonos nitrogenados líquidos, es todavía dudoso, pero en regiones de gran consumo, que justifiquen la gran inversión en instalaciones de distribución, es - probable que se incie pronto. Tambien se iniciará la fabricación de urea agrícola.

Se comenzó por fabricar sulfato amónico, para entrar despues en la fabricación de cianamida de cal y nitrato amónico cálcico. - Pronto empezará la fabricación de abonos complejos, dando con ello un paso más en la tecnificación de la agricultura española.

5. PERSPECTIVAS FUTURAS, DESARROLLO DEL CONSUMO Y POSIBILIDADES DE PRODUCCION.

a) Evolución del consumo.

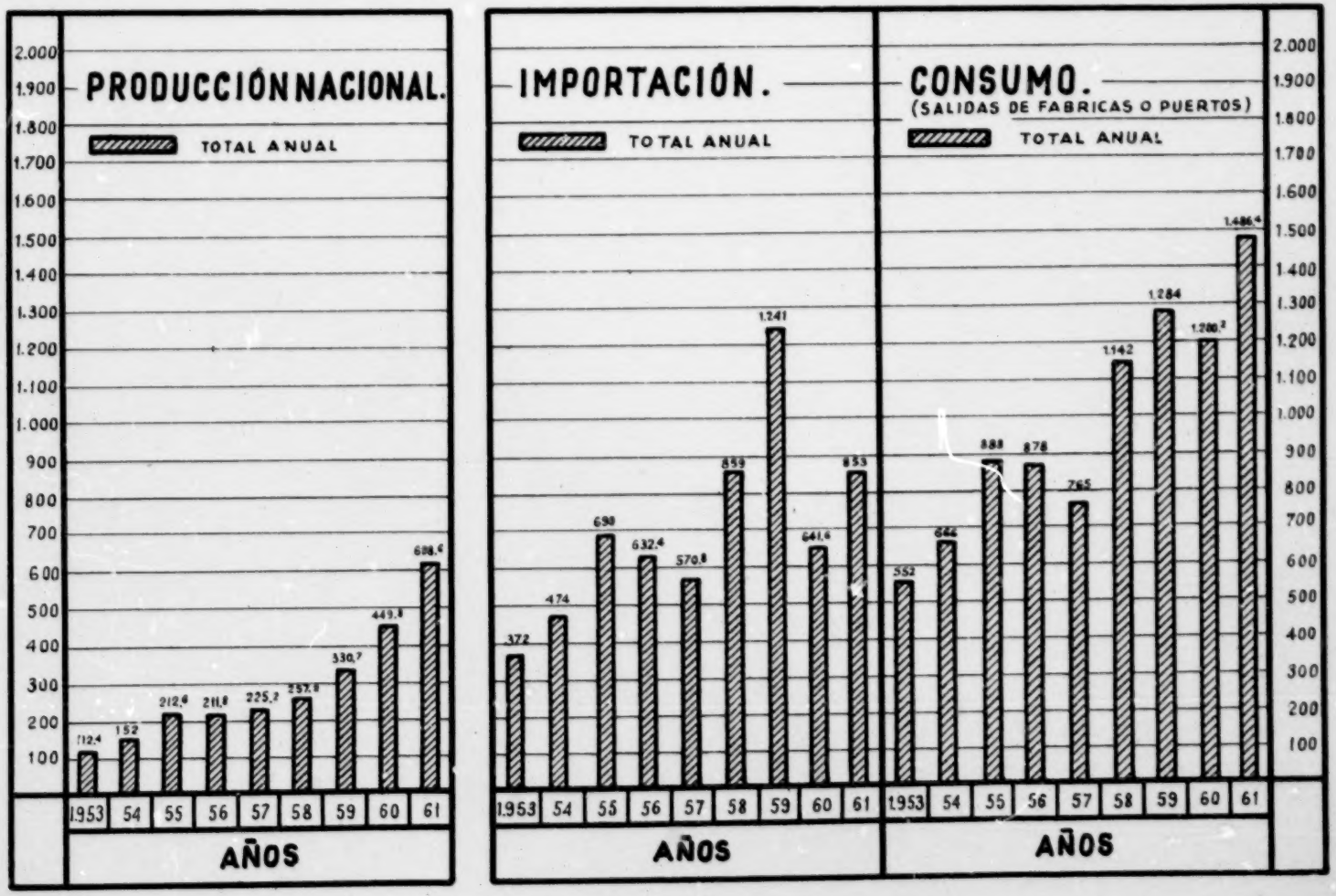
Como se indica en el apartado 4-c), el consumo se ha incrementado notablemente; el ritmo de crecimiento futuro del consumo está directamente relacionado con la aplicación de los planes de desarrollo agrícola. Los nuevos regadíos que se van extendiendo por el país contribuyen a un mayor consumo de abonos; la necesidad de mejorar el rendimiento unitario de la explotación agrícola, requiere un consumo más intenso de abonos; las mejoras de diversos cultivos y la mayor difusión del empleo de semillas especiales (principalmente híbridos) requieren tambien un mayor consumo de abonos.

Como estimación puede establecerse que el consumo de abonos nitrogenados llegue a ser, en un plazo de pocos años, de unas 400.000 Tm. de N anuales.

b) Posibilidades de su abastecimiento.

Hasta el año 1950, el abastecimiento del mercado español de abonos nitrogenados dependía practicamente en su totalidad de las importaciones. Actualmente, a pesar del enorme crecimiento del consumo, la producción nacional representa el 50% en el abastecimiento del mercado propio. El proximo año de 1963 la producción nacional abastecerá como mínimo el 75% de las necesidades del - mercado interior. Y en plazo de 3 ó 5 años, llegará la producción nacional a poder abastecer todas las necesidades de entonces y el desarrollo futuro del mercado consumidor nacional de abonos nitrogenados.

COMPARACIÓN DE LA PRODUCCIÓN, IMPORTACIÓN Y CONSUMO DE FERTILIZANTES NITROGENADOS



1109 S - Oct.1962 - 600

E/CONF.39/D/128
SUMMARY
24 Oct.1962
ENGLISH
ORIGINAL : SPANISH

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

SUMMARY

Agenda Item: D.11

Spain

NITROGEN FERTILISERS IN SPAIN, THEIR INDUSTRIAL DEVELOPMENT SINCE 1940

By Jaime de GAZTELU Y JÁCOME,
Engineer of the Ministry of Industry,

Cecilio RUIZ CASTILLEJOS,
Engineer-Director of
"Sociedad Ibérica del Nitrogeno",

Alberto OYARZABAL Y VELARDE,
Engineer-Director of
"Fertilizantes Nitrogenados S.A."

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

NITROGEN FERTILISERS IN SPAIN

THEIR INDUSTRIAL DEVELOPMENT SINCE 1940

Mr. Jaime de Gaztelu y Jácome. Engineer of the Ministry of Industry.

Mr. Cecilio Ruiz Castillejos. Engineer-Director of "Sociedad Ibérica del Nitrogeno".

Mr. Alberto Ovarzabal y Velarde. Engineer-Director of "Ferilizantes Nitrogenados S.A."

Summary

In these remarks on nitrogen fertilisers an account is given first of the beginning of this industry in Spain with the establishment of two companies in 1918 and 1923 and the situation at that time of the international market upon which Spanish consumption, for all practical purposes, depended.

The official provisions are then given which have been prescribed since 1940 for the purpose of stimulating private initiative with a view to the efficient development of this industry. This has been done mainly through lowering tariffs on imported machinery and reducing taxes during the initial period of operation of the various installations.

An account is given of the surveys carried out by the Ministries most affected and the plans drawn up for the development of the industry which were naturally based on the initially available materials, main consumer areas, means of transport, etc. The result of this was that from 1940 on a number of companies were set up with industrial plans of considerable scope, although they met with all kinds of difficulties as a consequence of the Second World War.

Next the various factories - their main characteristics, locations, raw materials, manufacturing processes, etc. - are

described. This is accompanied by a chart summing up fertiliser production, importation and consumption figures for the various years.

Lastly, future prospects, in view of progressive consumer growth owing both to technically normal employment and to new and important irrigated lands, are sketched. From an overall survey of the new installations in this branch of industry the conclusion is reached that within from three to five years production will be able to supply future requirements.

S - 1109 E - Oct.1962 - 1,600

ПРИМЕЧАНИЯ

1. Документы, включенные в число материалов, принятых для обсуждения на общих сессиях, будут в распоряжении делегатов Конференции на следующих официальных языках Организации Объединенных Наций: русском, английском, испанском и французском.

2. Документы, включенные в число материалов, принятых для обсуждения на специализированных сессиях, будут в распоряжении делегатов Конференции только на одном из этих официальных языков.

3. Резюме всех документов в том виде, в каком они были представлены их составителями, будут в распоряжении делегатов Конференции на следующих официальных языках Организации Объединенных Наций: русском, английском, испанском и французском.

4. До открытия Конференции документы и резюме не будут выпущены для общего распространения. Они будут опубликованы заблаговременно только в ограниченном числе экземпляров и исключительно для правительственных делегаций и других правомочных участников. Последующие опубликование и рассылка трудов Конференции будут обеспечены в соответствии с практикой Организации Объединенных Наций, как это установлено ее Издательским комитетом.

ЭКОНОМИЧЕСКИЕ ПРЕДПОСЫЛКИ РАЗВИТИЯ МАШИНОСТРОЕНИЯ И ЕГО РОЛЬ В ИНДУСТРИАЛИЗАЦИИ СОВЕТСКОГО СОЮЗА

А.Толкачев

канд.экономич.наук,зам.директора научно-исследовательского экономического института

Высокоразвитое машиностроение - важнейший фактор достижения высокого уровня производительности труда и решающее условие технико-экономической независимости страны.

Промышленность дореволюционной России имела слабо развитое машиностроение.Доля машиностроения в выпуске продукции крупной промышленности составила в 1913 г.всего 7%. Отраслевая структура ее была неразвитой. По классификации статистической отчетности она содержала пять отраслей: машиностроительное,котельное и механическое производство;производство земледельческих машин и орудий;вагоностроение;судостроение;электротехнические и электромеханические заводы.

Вследствие отсталости машиностроения хозяйство России было вооружено современными средствами труда вчетверо хуже Англии, впятеро хуже Германии, вдесятеро хуже Америки.

Неразвитость русского машиностроения объяснялась социально-экономической отсталостью России и огромной зависимостью ее промышленности от иностранного капитала.

Хозяйство России имело аграрный характер.Доля сельского хозяйства в валовом общественном продукте составляла две трети,а в общей численности занятых - три четверти;в сельском хозяйстве преобладало мелкое производство,основанное на примитивных орудиях труда и энергии животных; уровень жизни народа и интеллектуального развития народа были низкими по сравнению с наиболее развитыми странами Европы и Америки.

На экономику России огромное влияние оказывал иностранный капитал,доля иностранного капитала составляла в металлообрабатывающей промышленности накануне войны 1914 г.почти 62%, даже небольшие объемы потребностей в машинах покрывались собственным производством не более чем на половину.

Преодоление отсталости России в кратчайшие исторические сроки было первой задачей советского государства после социальной революции 1917 г. Для этого были осуществлены крупные реформы: национализированы банки, промышленность и транспорт; проведена аграрная реформа, введена государственная монополия внешней торговли и др.

Централизация политической власти и экономических ресурсов в руках народа,создание подлинно демократического общественного строя раскрыли огромные возможности для быстрого социально-экономического прогресса. Чтобы превратить эту возможность в действительность,необходимо было проведение соответствующей задачам прогресса экономической политики и организации новых форм хозяйственного управления.

Важнейшими мерами в области промышленного развития были организация народнохозяйственного планирования и проведение индустриализации страны.

Индустриализация - это процесс превращения страны из сельскохозяйственной в промышленную путем создания крупного машинного производства во всех отраслях материального производства. Этому процессу

соответствует проводимая государством экономическая политика преимущественного развития тяжелой промышленности и ее важнейшей отрасли - - машиностроения, которому принадлежит ведущая роль в техническом перевооружении народного хозяйства. Техническое перевооружение отраслей производства на основе машинной техники и определяемый этим рост производительности труда - основное условие к достижению главной цели социалистического государства - обеспечение неуклонного роста материального благосостояния и культурного уровня жизни всего народа, технико-экономической независимости страны и ее обороноспособности.

Индустриализация народного хозяйства СССР была осуществлена в очень короткие сроки. В 1937 г. в валовой продукции крупной промышленности и сельского хозяйства доля промышленности составила 77,4%, а объем производства продукции машиностроения и металлообработки увеличился в 20 раз по сравнению с 1913 годом. Благодаря этому, как показывает опыт Советского Союза, был достигнут огромный технический и экономический прогресс: народное хозяйство стало развиваться устойчиво высокими темпами; резко повысился уровень механизации труда и его производительность в промышленности, в сельском хозяйстве, на транспорте. Уже в 1931 году была ликвидирована безработица; в 1937 г. Советский Союз вышел на второе место в мире по производству промышленной продукции. Развитие машиностроения опережающими темпами в Советском Союзе властно диктовалось рядом причин. Объективной необходимостью создания адэкватной социалистическому способу производства материально-технической базы, характерной чертой которой является всеобщность крупного машинного производства. "Единственной материальной основой социализма, - учил В.И. Ленин,- может быть крупная машинная промышленность, способная реорганизовать и земледелие" х)

Высокоразвитое машиностроение создает материальные элементы для перехода в сельском хозяйстве от мелкого малопроизводительного и низкодоходного к крупному социалистическому производству, приближающемуся по технике, методам организации и производительности труда к промышленности. Только на базе машинной техники возможно вовлечение в промышленную переработку в больших масштабах огромных природных ресурсов, которыми располагает Советский Союз.

Необходимо было восстановить разрушенное во время войны хозяйство, преодолеть его огромную техническую отсталость, обеспечить население работой, питанием, одеждой и т.д.

Об упадке производительных сил в этот период указывают следующие данные: в расчете на душу населения произведенный национальный доход в 1922 г. составил около 37 руб; продукция машиностроения - I руб. 68 коп. х); выработка электроэнергии - 3,8 квтч. хх); выплавка стали - I,5 кг хх).

Советский Союз находился в постоянной опасности новой военной интервенции, на что указывали непрерывно повторяющиеся провокации на границах, непризнание Советского Союза на протяжении длительного периода рядом государств.

Форсированная машинизация народного хозяйства потребовала определенных условий:

- централизованной в государственных масштабах планово осуществляемой политики преимущественного развития машиностроения и единой технической политики.

х) В.И.Ленин, Соч. т.32, стр.434
х) Данные за 1921 год.
хх) Данные за 1920 год.

- аккумуляции государством накоплений и перераспределения их в пользу машиностроения, а также предпочтительного обеспечения материальными ресурсами и рабочей силой;
- государственной подготовки кадров инженеров и квалифицированных рабочих;
- создания емкого внутреннего рынка на продукцию машиностроения;
- развития широких экономических связей с индустриально развитыми странами, необходимость в которых особенно остро ощущается в начальном периоде создания машиностроительной промышленности;
- разумное сочетание технической реконструкции имеющихся предприятий и нового строительства, а также планового определения первоочередности в развитии отраслей внутри машиностроения.

Формирование и осуществление политики ускоренного развития машиностроения осуществляется государством в централизованном порядке, опираясь на экономические ресурсы и огромную творческую инициативу народа. На протяжении одного года после революции в Советской России были переданы в собственность государства все крупные машиностроительные и металлообрабатывающие предприятия. Одновременно государство стимулировало создание акционерных обществ с его участием, а также поддерживало мелкие предприятия по металлообработке, принадлежащие частным лицам. В декабре 1917 г. был создан ВСНХ - государственный орган руководства народным хозяйством, в составе которого было управление металлообрабатывающей промышленности, осуществлявшее восстановление и реконструкцию этой отрасли. В дальнейшем, по мере развития машиностроения, органами оперативного управления были тресты, наркоматы, министерства машиностроительной промышленности. В настоящее время оперативное руководство машиностроением осуществляют Советы народного хозяйства, а техническая политика формируется Государственным комитетом по автоматизации и машиностроению при Совете Министров СССР.

Государственное планирование развития машиностроения в его связи с народным хозяйством в целом и отраслями народного хозяйства осуществляют плановые органы, в составе которых имеются отделы по отраслям машиностроения.

Вследствие ограниченности материальных и финансовых ресурсов в первые годы после революции производство сосредотачивалось на наиболее крупных технически оснащенных предприятиях машиностроения.

К 1925/1926 году объем продукции машиностроения достиг уровня 1913г., период восстановления для этой отрасли закончился и начался период коренной технической реконструкции. Восстановление и реконструкция машиностроения потребовали больших капитальных вложений.

С 1918 по 1960 гг. вложено капитальных средств в машиностроение 21463 млн.руб., или 16,1 от общей суммы вложений в промышленность. В годы первых пятилетних планов (1928-1940гг.) удельный вес инвестиции в машиностроении был еще более высоким и составил 29% ; в послевоенные годы вложения в машиностроение снизились и стабилизировались в течение последнего десятилетия на уровне 12-13%.Однако доля машиностроения в промышленной продукции растет, что достигается за счет более полного освоения действующих производственных мощностей.

Основными источниками накоплений, наряду с прибылью машиностроительной промышленности, были: прибыли легкой и пищевой промышленности, внешней торговли, часть чистой продукции сельского хозяйства, а также часть доходов трудящихся в виде налогов, целевых государственных займов (займов индустриализации) и сбережения трудящихся, которые перераспределялись через государственный бюджет в интересах развития машиностроения.

Машиностроительные предприятия пользовались преимуществом при распределении новых контингентов рабочей силы, поступающей в промышленность.

Удельный вес машиностроения в общей численности занятых повысился до 29% в 1940г. и 30,5% в 1960г. против 14,5% в 1913г., а общая численность рабочих в машиностроении возросла за 40 лет (с 1917 по 1957гг.) почти в 9 раз. Коренным образом изменился профессиональный состав рабочих, повысилась их квалификация, резко изменилось соотношение между рабочими и инженерами. Количество специалистов на 1 января 1960г. составило: с высшим образованием - 224,4 тыс. или 45% ко всем специалистам, занятым в промышленности, и со средним специальным образованием соответственно - 497 тыс.чел. и 42%.

Потребности машиностроения имели преимущество в программах импорта. В период восстановления народного хозяйства (1922-1928гг), а также в годы первой пятилетки ввозимое оборудование использовалось по преимуществу в производстве. В 1927/28гг импорт машин составил 32,5% (а 1913г. - 68,8%), в том числе: станки для обработки металлов - 67,1%, паротурбины - 52,6%, тракторы - 69%. К концу первой пятилетки, в 1931г., доля импортного оборудования снизилась до 17,8% и в 1935г - до 1%. С рядом фирм были заключены договора на комплексную поставку оборудования машиностроительных предприятий, а также приглашались крупные инженеры и квалифицированные рабочие.

Проводилась политика концентрации производства на крупных предприятиях, их специализация и широкое развитие производственного кооперирования.

За годы советской власти в СССР создано технически современное крупное машиностроение. По классификации статистического учета 1936г. машиностроительная продукция учитывалась по 28 отраслям, классификация 1960г. включает 33 отрасли и 21 подотрасль. Этот процесс шел как по пути планомерной реконструкции старых предприятий в первый период индустриализации, так и интенсивного нового строительства. Крупная производственная база современного машиностроения была впервые создана в годы первой пятилетки. Уже к первому году второй пятилетки удельный вес реконструированных заводов в общем выпуске продукции возрос почти в 7 раз. Однако реконструкция старых предприятий не могла обеспечить необходимые сдвиги в структуре машиностроения. Это могло быть достигнуто лишь интенсивным новым строительством. Доля новых заводов в валовой продукции уже в первом году второй пятилетки достигла 40%. На долю новых отраслей машиностроения - автомобильной и тракторной - вместе с созданными, по-существу, заново за годы первой пятилетки сельскохозяйственным машиностроением, горнометаллургическим и химическим машиностроением приходилось к концу первой пятилетки около 30% всех производственных фондов, 33% всех мощностей двигателей, и 23,5% всей валовой продукции. Кроме названных отраслей, крупнейшими являлись энергетическое машиностроение, паровозо и вагоностроение, а также судостроение. На их долю приходилось 30% производственных фондов, 37,6% мощности двигателей и 33% всей продукции.

Во вторую пятилетку произошли дальнейшие сдвиги в отраслевой структуре машиностроения, отражающие преимущественный рост выпуска тех средств производства, которые необходимы для производства средств производства. Так, по сравнению с 1913 годом, к 1938 году наибольший рост получило производство металлорежущих станов, паровых котлов, дизелей и т.д. За все годы советской власти наиболее высокими темпами развивалось энерго- и электромашиностроение, станкостроение, металлургическое, горное и химическое машиностроение, производство строительного и подъемно-транспортного машиностроения, тракторостроение и др.

Такой рост машиностроения и особенно его главнейших отраслей позволил осуществить техническую реконструкцию всех отраслей народного хозяйства. В энергетике был осуществлен переход от маломощных турбин к мощным турбинам (более 100 тыс.квт) с высокими и сверхвысокими параметрами пара. В черной металлургии средний объем доменных печей увеличился с 290 м3 в 1928г. до 748 м3 в 1955г.; доля механизированных работ достигла в значительной части основных производственных процессов добывающей промышленности 80-100%; в строительстве - механизация земляных работ, приготовления бетона, растворов, укладки бетона - 60-90%.

При этом в ряде отраслей добывающей промышленности была осуществлена техническая революция в методах производства, что подтверждают следующие данные по угольной промышленности.

В 1913г. производственные операции по зарубке и отбойке, навалке, доставке и погрузке угля выполнялись вручную. х) В 1940г. все указанные операции, за исключением навалки угля в очистных забоях, были механизированы на 75-95%, а в 1960г. - до 100%, при механизации навалки угля почти на 50%.

За годы советской власти энергетические мощности сельского хозяйства возросли более чем в 6 раз. Коренным образом изменилась их структура: в 1916г. энергия механических двигателей в балансе энергетических ресурсов составляла менее одного процента, а в 1960г. - 97%. Пахота тракторными самоходными машинами механизирована в настоящее время на 98%, сев - на 97%, уборка зерновых культур - на 93% и т.д. Сельское хозяйство стало крупным потребителем машин.

Намного повышен технический уровень вооружения транспорта. Более чем в 3 раза увеличена мощность локомотива. В последние годы широко осуществляется переход на более высокоэкономичную тепловозо-электровозную тягу; грузоподъемность грузовых автомобилей доведена до 5-7 тонн, а самосвалов до 25, 40-50 тонн.

Машиностроение обеспечило развитие отраслей новейшей техники: приборостроения, радиотехники, электронной техники, атомной техники, быстровычислительной и кибернетической техники и т.д.

Темпы роста производства продукции машиностроения значительно превосходили темпы развития промышленности в целом. Так, за первую пятилетку (1928-1932гг.) производство продукции машиностроения увеличилось в 3,99 раза, а промышленной продукции - в 2,02 раза, за вторую пятилетку (1933-1937гг.) соответственно 2,83 и 2,2 раза; за третью пятилетку (1938-1940гг.) - 76% и 45%; за военные годы и четвертую пятилетку (1941-1950гг.) - 2,15 и 1,73 раза; за пятую пятилетку (1951-1955гг.) - 2,2 и 1,85 раза; в 1960г. производство продукции машиностроения по сравнению с 1918 годом увеличилось более чем в 800 раз, при росте всей промышленной продукции в 45 раз.

По семилетнему плану развития народного хозяйства СССР (1959-1965гг) и генеральному плану на 20 лет также намечено опережающее развитие машиностроения. При росте промышленной продукции в 1959-1965гг. на 80%, производство продукции машиностроения и металлообработки увеличится в два раза.

Для Советского Союза важнейшими проблемами перспективного периода являются - ускорение технического прогресса, обеспечение общественного производства энергией и материалами, создание в стране изобилия предметов личного потребления и услуг на основе мощного роста производства сельскохозяйственной продукции и соответствующих отраслей промышленности, повышение производительности труда до такого уровня, при котором будет возможно перейти от 7 часового к 5-6 часовому рабочему дню.

х) Лишь на операциях по зарубке угля механизированная зарубка составляла 1,7% от общего объема работ.

Исходя из этого намечена программа развития машиностроения в перспективном периоде, предусматривающая:

- увеличение производства энергетического оборудования за семь лет примерно в 3 раза, химического оборудования - в 3,2 - 3,4 раза, технологического оборудования для цементной промышленности - в 2,5 - 3,1 раза, оборудования для прокатного производства в 2,8-2,6 раза и т.д. при одновременном повышении технико-экономических параметров машин;

- проектирование и изготовление комплексов машин и приборов, необходимых для завершения в 70-х годах комплексной механизации в промышленности, на транспорте: в строительстве и в сельском хозяйстве, для которого в период 1959-1965гг. намечено освоить производством до 550 наименований машин;

- создание новых машин, аппаратов и приборов с использованием достижений радиоэлектроники, сверхпроводимости, ультразвука, полупроводников и т.д., необходимых для повышения скоростей течения технологических процессов, их непрерывности и автоматизации;

- обеспечения необходимыми комплексами машин прогрессивных сдвигов в структуре топливного баланса страны, в структуре сырьевых ресурсов и материалов, в структуре транспортных перевозок.

В семилетнем плане и плане на 20 лет предусмотрены высокие темпы роста национального дохода, которые обеспечиваются по преимуществу путем повышения производительности труда. В текущем семилетии на основе производительности труда будет получено не менее 3/4 прироста национального дохода, а в двадцатилетнем периоде - свыше девяти десятых и лишь незначительная часть прироста обеспечивается за счет увеличения численности работников производства. Материальной основой выполнения этой задачи является машиностроение, вооружающее труд людей высокопроизводительной техникой.

Для развития народного хозяйства СССР все большее значение имеет научно-технический прогресс во всех областях науки, техники и производства, полное использование преимуществ которого раскрывает колоссальные возможности роста экономики. В ускорении темпов научно-технического прогресса машиностроению принадлежит ведущая роль. В Советском Союзе развитие науки и техники осуществляется на основе государственного планирования. Планы по новой технике включают в себя, наряду с разработкой теоретических проблем, разработку и изготовление образцов новых важнейших машин, механизмов и оборудования; разработку и внедрение средств механизации и автоматизации производственных процессов и наиболее совершенной технологии; промышленное производство новых видов продукции машиностроения (и прекращение производства машин, аппаратов и приборов, устаревших в конструктивном и технологическом отношениях.

Наряду с планом по новой технике, на машиностроительных предприятиях разрабатываются планы организационно-технических мероприятий, в которых предусматриваются более мелкие (локальные) усовершенствования техники и организации производства. В техническом усовершенствовании производства активно участвуют рационализаторы и изобретатели из числа рабочих, которые ежегодно вносят десятки тысяч предложений, многие из которых внедряются в производство.

В целях ускорения технического прогресса на машиностроительных предприятиях, в Советском Союзе введена государственная система премирования инженеров и рабочих предприятий, а также работников научных институтов и проектных организаций; при совнархозах созданы денежные фонды для покрытия затрат предприятий по освоению новой техники, что позволяет продавать ее заводам-потребителям по ценам, соответствующим затратам серийного выпуска продукции плюс нормальная прибыль. Введена

также система краткосрочного банковского кредитования (на 2-3 года) промышленных предприятий для осуществления мероприятий по механизации и автоматизации производства, не предусмотренных государственным планом по новой технике и государственным планом капитальных вложений. Наконец, на машиностроительных предприятиях СССР созданы так называемые фонды предприятий путем отчисления в установленном размере от плановой и сверхплановой прибыли. Из общей суммы этого фонда 40% используется на технические усовершенствования производства.

Советский Союз вступил на путь индустриального развития позднее, чем наиболее развитые страны Европы и Америки. Это позволило с самого начала машинизировать отрасли народного хозяйства на более высоком, соответствующем периоду 30-40х годов XX века, техническом уровне и широко использовать в порядке научно-технического обмена последние достижения мировой науки и техники. Эта закономерность присуща Германии, которая вступила на путь индустриального развития в последней трети XIX в., т.е. позднее Англии, Соединенных Штатов Америки и которая также широко использовала это исторически объективно обусловленное обстоятельство.

Слаборазвитые страны, вступившие или вступающие на путь индустриального развития в 50-60-х годах XIX века имеют особенно благоприятные условия в этом смысле, а именно: они могут использовать научно-технические достижения большего количества стран, при наличии доброй воли оказать им бескорыстную со стороны последних, а также использовать современную машинную технику, обладающую колоссальным потенциалом экономического развития. Это обстоятельство существенно сократит время и издержки, необходимые для роста экономического потенциала ныне отсталых стран и их социально-экономического прогресса.

975 R - Nov.1962 - 600

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

E/CONF.39/D/129
SUMMARY
3 Jan.1963
ENGLISH
ORIGINAL : RUSSIAN

SUMMARY

Agenda Item: D.9

Byelorussian SSR

ECONOMIC PREREQUISITES OF MECHANICAL ENGINEERING DEVELOPMENT AND ITS ROLE IN THE INDUSTRIALIZATION OF THE SOVIET UNION

By A. TOLKATCHYEV,
Candidate of Economic Science,
Deputy Director,
Scientific-Research Economic Institute

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

1. A highly developed mechanical engineering industry has been created in the USSR within a historically short period. In 1960 the output of mechanical engineering increased over 300 - fold as compared to 1913 and the number of specialized branches, by which the state registers the output of production, was equal to 33 branches and 21 subbranches as compared to five branches in 1913. Mechanization of all branches of the people's economy took place and a technological revolution in methods of production was carried out in the branches of extractive industry and agriculture. Supply of labour with machinery has become the most important factor in growth of productivity of labour and in an immense increase of volume of industrial output as well as in a considerable rise of the income of the people, of their well-being and intellectual development. The experience of the Soviet Union is a convincing proof of the fact that an all-round development of mechanical engineering is the most important condition of the country's technical and economic independence and its defensive capacity.

2. An objective necessity to achieve this aim for industrially backward countries that entered the path of accelerated economic development is organization of their own mechanical engineering at a high rate, that outstrips the rate of development of other branches. At the initial stages of industrialization the rate of mechanical engineering preferential development should be higher than at the subsequent stages.

A concrete ratio in the development of mechanical engineering and other branches should be determined by plans, proceeding from the revealed need for mechanical engineering production and available production capacities, the extent of their employment as well as the resources of capital investments, metal, equipment.

3. Accelerated development of mechanical engineering calls for a number of conditions:

- centralisation on a state scale and planned policy of preferential development of mechanical engineering and the policy in the technical sphere;

- preferential allocation of capital investments, supply of material and labour;

- organization of a capacious interior market for mechanical engineering products;

- development of broad economic ties with industrially developed countries, especially at the initial stage, employment of their technical experience and the forms of organization of production;

- rational combination of technical reconstruction of existing enterprises with the construction of new ones.

In the Soviet Union after the Socialist revolution of 1917 in the course of one year all large mechanical engineering and metal-working enterprises were nationalized, state bodies of management were organized and there began working out of plans for turning out production at these enterprises.

During the period since 1917 till 1928 increase of industrial output was mainly achieved by way of rehabilitation of the existing enterprises with a considerable renewal of their equipment. Since 1928 in the USSR state perspective planning of the people's economy was put into practice, which included the planning of development of all industries and culture. Practically since that time there began a period of radical technical reconstruction of the people's economy on the basis of machinery. New construction is characteristic of this period.

Mechanical engineering development requires considerable capital expenditures and realization of the policy which favours mechanical engineering in distribution of the available capital investments, labour resources and training of cadres.

The share of investments into mechanical engineering during the period since 1918 till 1960 as compared to the whole sum of capital investments into industry was equal to 16.1 per cent; during the first five-year plan it was con-

siderably higher and was equal to 29 per cent; in 1940 out of the total number of industrial workers 29 per cent worked in the mechanical engineering; at present their number equals 30.5 per cent; 45 per cent of specialists with higher and 42 per cent of specialists with secondary education worked in the mechanical engineering in 1960.

Alongside the interior financial, material and labour resources aid on the part of the most developed countries is of great importance in the carrying out of industrialization. This aid was not rendered to the Soviet Union. But the Soviet Union employed international trade to buy machines, equipment, instruments and she used the service of foreign engineers and skilled workers, engaged by contracts.

4. In the interests of creation of one's own mechanical engineering industry and assimilation of the newest achievements of mechanical engineering techniques the experience of the most industrially developed countries should be broadly employed through purchase of the newest samples of articles of production, technical documents, consultations, instructing. All this will permit to shorten the periods of designing and organization of production, decrease expenditures.

5. Acceleration of industrialization may be promoted by a broad employment of cooperation of friendly countries in the construction of large enterprises. Alongside the construction of large enterprises with the aim of achieving the quickest "returns" of capital expenditures, it is expedient to construct small specialized factories, which should be equipped with new machinery and broadly cooperate between themselves.

6. Considerable difficulties in the development of mechanical engineering are caused by the necessity to have engineer cadres of many specialities and cadres of high skilled workers.

Training of workers in the USSR was carried on through a system of special technical schools (industrial schools, schools of factory-work training etc.), as well as through training and passing exams on minimum of technical knowledge without discontinuing basic work, through factory apprenticeship under the guidance of skilled workers and foremen, etc.

In the training of engineers the possibilities to receive education abroad in industrially developed countries must be used. Studying by correspondence and in evening classes as well as in the systems of factories - higher educational establishments are of special importance to train such cadres inside the country.

7. Employing the advantages of planned economy and the above mentioned directions of policy during a short period of time, a large-scale mechanical engineering industry was created in the Soviet Union, on the basis of which the processes in all branches of the people's economy were mechanized.

As far back as 1931 the USSR surpassed all countries, but the USA, in the output of mechanical engineering. The plan of development of the people's economy of the USSR for 1959-1965 and the general plan for the period of two decades envisage further preferential development of mechanical engineering as compared to the industry as a whole; they provide for the quickest possible increase of mechanical engineering output for power engineering chemical industry, agriculture, as well as production of instruments, means of automation and automatic lines in the volume, necessary to complete complex mechanization of industry in all branches and broad automation of industrial processes. Specialization of mechanical engineering enterprises will receive further development. Increase of mechanical engineering output during this period is achieved in a considerable degree by modernization of equipment and reconstruction of enterprises yielding great economic effects. With the aim of the quickest working out of new articles and organization of their industrial production a system of material stimulation (giving a bonus) for collectives of enterprises, research and designing institutes as well as for separate workers and specialists; state planned development of science and technology, state financing of technical progress, employment of means of enterprises and a system of a short-term credit by the bank as well as a system of encouraging prices for new, more technically perfect articles of mechanical engineering were broadly employed.

S - 975 £ - Jan.1963 - 1,600

E/CONF.39/D/130
24 Oct.1962
ORIGINAL : FRANCAIS

CONFÉRENCE DES NATIONS UNIES
SUR L'APPLICATION DE LA SCIENCE ET DE LA TECHNIQUE
DANS L'INTÉRÊT DES RÉGIONS PEU DÉVELOPPÉES

Point de l'ordre du jour : D

France.

L'ORGANISATION DES ZONES INDUSTRIELLES

Par Paul Henri DAVID,
Inspecteur au Ministère
de la Construction

Les mémoires rédigés à l'intention de la Conférence des Nations Unies sur l'application de la science et de la technique dans l'intérêt des régions peu développées sont des documents de travail. Ils sont publiés tels qu'ils ont été présentés et les assertions et opinions qu'ils contiennent sont celles de leurs auteurs.

NOTES

1. Les mémoires choisis pour être présentés en séance générale pourront être obtenus à la Conférence dans les langues officielles suivantes des Nations Unies: anglais, espagnol, français et russe.

2. Les mémoires choisis pour être présentés en séance spéciale pourront être obtenus à la Conférence dans l'une seulement de ces langues officielles.

3. Les résumés qui ont été rédigés pour tous les mémoires par les auteurs de ceux-ci pourront être obtenus à la Conférence dans les langues officielles suivantes des Nations Unies: anglais, espagnol, français et russe.

4. Préalablement à la Conférence, les mémoires et les résumés ne feront pas l'objet d'une distribution générale mais d'un tirage restreint destiné aux délégations des gouvernements et autres participants officiels. La publication et la distribution générale des actes de la Conférence s'effectueront conformément aux règles et pratiques agréées par le Comité des publications des Nations Unies.

L'ORGANISATION DES ZONES INDUSTRIELLES

L'organisation de zones destinées à accueillir les industries nouvelles présente, pour le développement économique des agglomérations, un intérêt fondamental. De telles initiatives constituent en effet, à l'égard des entrepreneurs, un élément des plus attractifs. Les opérations d'infrastructure préliminaires contribuent à la fois à minorer le coût global des implantations, à diminuer la durée des travaux, à épargner enfin aux industriels, dans leurs rapports avec les services publics et les entreprises privées, de nombreuses démarches auxquelles ils sont souvent mal préparés. Surtout l'aménagement de terrains d'accueil révèle, de la part des autorités publiques ou des élites locales, un souci de progrès et un goût des réalisations concrètes qui traduisent, à l'égard du développement industriel, une attitude favorable des communautés.

Pour ces dernières, les avantages de telles opérations ne sont pas moins marqués. Ces initiatives favorisent l'expansion économique, contribuent à résorber le sous emploi, réel ou virtuel, et assainissent les budgets locaux. De plus, l'organisation de zones industrielles permet de sélectionner les entreprises qui correspondent aux possibilités et aux besoins de la communauté. Ainsi peut se créer entre les activités, le site et les hommes un équilibre volontaire; entre le passé et l'avenir d'un groupe sociologique, une continuité, dans le développement qui est un gage d'expansion harmonisée, une promesse de durée. Ces considérations prennent une importance renouvelée dans les pays en voie de développement où les progrès doivent être plus rapides, alors que les structures fondamentales risquent de se trouver moins adaptées à leurs nouvelles fonctions.

Encore est-il nécessaire d'éclairer ces interventions par de rigoureuses analyses afin de s'assurer que les choix économiques qui s'imposent ne seront pas inspirés par des considérations politiques, des pressions de groupes, ou par le recours au hasard. De telles études s'imposent en tout état de cause, que la promotion des zones examinées incombe à des organismes publics ou para-publics, ou qu'elle soit laissée à des sociétés privées, voire à de simples lotisseurs. Dans les premières éventualités, les interventions politiques ou professionnelles sont les plus à craindre mais, dans les secondes, le souci exclusif de l'enrichissement immédiat de quelques uns risque de provoquer, à long terme, l'appauvrissement de tous. En bref, seul le recours à l'étude objective de l'ensemble des éléments en cause, et de leurs prolongements prévisibles, écartera interventions particulières et vues à court terme. Seul il autorisera l'aménagement optimum des zones considérées.

Les études préliminaires à l'installation des zones industrielles.

Ces recherches ont pour premier objet la mise en évidence des facteurs susceptibles, dans leur état actuel, d'exercer une influence, favorable ou non, sur la localisation des usines nouvelles dans la collectivité examinée. On peut distinguer à cet égard conditions techniques et données économiques.

Les conditions techniques à étudier comprennent :

1. La climatologie : températures, précipitations, hygrométrie, vents dominants, brouillards, orages etc. Ces éléments exercent une influence non négligeable sur
   a. Les conditions techniques de fonctionnement,
   b. La productivité du travail,
   c. Les coûts d'exploitation : ainsi les dépenses d'air conditionné varient en fonction de la température et du degré d'humidité de l'atmosphère,
   d. Les dépenses d'installation : l'isolation thermique des ateliers notamment est plus couteuse dans les pays très froids ou très chauds.

2. La nature et l'importance des matières premières locales : ces dernières s'entendent non seulement des productions du sol ou du sous-sol, mais aussi des produits industriels bruts ou semi-finis et des services susceptibles d'être utilisés par les entreprises nouvelles : Entretien, laboratoires, centres d'essai ou de contrôle, traitement des informations statistiques ou comptables. On insistera en particulier sur les possibilités de sous-traitance. Ce milieu industriel possède d'autant plus d'importance que les firmes sont plus petites ou plus spécialisées.

3. La situation géographique par rapport aux principales matières premières pour l'industrie : minerais, charbon, fer et acier, aluminium, cuivre, matériel électrique, matières plastiques, produits chimiques, bois, papier, carton, verre, peintures, vernis, caoutchouc, fibres textiles, produits agricoles utilisés par l'industrie. Si possible on indiquera approximativement les quantités disponibles.

4. Les moyens de transport par route, fer, eau et air. Les conditions générales d'utilisation de ces modes de transport seront indiquées. Ainsi on précisera la charge maximum des camions, le tonnage des bateaux, le type des avions susceptibles d'être employés. Il conviendra de distinguer entre le transport des personnes et celui des marchandises.

5. La main d'oeuvre : disponibilités en quantités et qualités. Des précisions seront fournies sur la main d'oeuvre féminine, et sur les cadres susceptibles d'être recrutés sur place.

6. L'énergie : électricité, gaz, produits pétroliers. Les possibilités locales de fourniture seront examinées.

7. L'eau : un facteur technique d'une importance considérable. Dans l'étude des disponibilités on distinguera l'eau potable de l'eau industrielle. Les modes de captage seront indiqués et les résultats de l'analyse des eaux seront retenus.

8. Les possibilités de traitement des résidus, solides et liquides : la nature, la capacité et les disponibilités des équipements existants et des projets seront relevés. Des indications sommaires pourront être recueillies sur les modalités des installations susceptibles d'être construites.

9. Les équipements généraux : services de lutte contre l'incendie, de police, d'entrepôts publics etc. On ne retiendra ici que les installations directement utilisables par les firmes et à défaut desquels les industriels seraient contraints de s'équiper eux-mêmes à leurs frais. On rejoint donc l'aspect économique du problème.

Les données économiques à examiner concernent :

1. Les marchés locaux : pouvoirs d'achat de l'agriculture, de l'industrie, des services et des particuliers, en biens susceptibles d'être produits par des entreprises nouvelles. On sera obligé le plus souvent de se contenter, à cet égard, d'approximations sommaires. L'expérience montre cependant qu'il n'est ni long, ni difficile d'esquisser à grands traits la comptabilité économique d'une agglomération et de son hinterland.

2. La situation géographique par rapport aux principaux marchés, les clients à retenir pouvant être des agriculteurs, des industriels, des prestataires de services ou des simples particuliers. Dans toute la mesure du possible, l'importance des marchés sera indiquée.

3. Le prix des transports par route, fer, eau et air, pour les personnes et les marchandises. Le coût des charges annexes, notamment des droits de quai ou assimilés, et des frais de manutention, ne sera pas oublié.

4. Les salaires par qualification, y compris ceux de la main d'oeuvre féminine et des cadres. On distinguera pour ces derniers la rémunération des collaborateurs recrutés sur place et celle des agents transférés. Les coûts indirects du travail, tels que charges sociales, primes, avantages divers en nature ou en espèces, seront également pris en considération.

5. Le prix de l'énergie : électricité, gaz, produits pétroliers, en distinguant selon les quantités utilisées.

6. Le prix de l'eau : potable ou industrielle. Pour l'eau que les industriels devraient se procurer eux-mêmes par prise, forage ou adduction, on effectuera une étude sommaire du prix de revient.

7. Le coût de traitement des résidus solides et liquides en utilisant les équipements existants et projetés, ou les installations susceptibles d'être construites.

8. Le prix des assurances contre l'incendie : cette donnée est elle-même en liaison étroite avec l'importance des services de protection, et les disponibilités en eau.

9. Les impôts locaux.

10. Le prix des services industriels définis ci-dessus (conditions techniques 2) : ces tarifs sont eux-mêmes liés aux salaires des cadres.

11. Les coûts de construction des bâtiments industriels, de leur infrastructure et de leur environnement : ces prix dépendent essentiellement des salaires et du coût des matières premières (acier, ciment, aluminium, matières plastiques).

12. Les possibilités locales de financement : disponibilités des banques et des organismes de développement.

13. Les taux effectifs d'intérêt demandés par les prêteurs locaux pour le financement industriel à moyen et long terme.

Cependant un grand nombre de ces données surtout économiques, sont elles-mêmes le reflet de facteurs sociologiques qu'il importe également d'analyser :

1. La démographie : la pyramide des âges et les mouvements migratoires seront examinés.

2. L'attitude de la communauté à l'égard des industriels : accueil, initiatives concrètes en faveur des entreprises nouvelles.

3. Les structures des industries existantes : nombre et importance par branche; ouvertures et fermetures d'établissements au cours des dix dernières années.

4. L'expérience des entrepreneurs locaux, notamment sur la productivité de la main d'oeuvre, son adaptation aux rythmes industriels, son instabilité, son absentéisme.

5. Les relations entre le capital et le travail : effectifs syndicaux, nombre et durée des grèves et des lock-out.

6. Le logement : possibilité et prix pour la location et l'accession à la propriété.

7. L'agrément des zones résidentielles : situation, espaces verts, voisinage, bruits et fumées.

8. Le coût de la vie pour la nourriture, les vêtements, les distractions, les biens durables et les services.

9. Le budget local : l'importance des investissements; l'endettement public; la pression fiscale.

10. L'équipement sanitaire : hopitaux, dispensaires, maternités, médecins, dentistes, pharmaciens.

11. Les équipements sociaux et culturels : les crèches et garderies d'enfants; l'enseignement des divers degrés; la formation professionnelle des adultes; les bibliothèques.

12. L'équipement commercial et touristique : les commerces, les hôtels, l'aménagement des sites de loisirs.

Les analyses précédentes étant effectuées, il convient d'en projeter les résultats dans un avenir prévisible, de l'ordre de dix ans. En effet les industriels ne sont pas concernés par les salaires, les disponibilités de main d'oeuvre, ou les équipements actuels, mais par ceux des années à venir. Il importe donc d'adopter une vue systématiquement prospective. Dans ce but on utilisera toutes les informations disponibles et notamment les plans de développement généraux, les projets des Administrations, les prévisions des entreprises, l'évolution des régions parvenues à un stade ultérieur de développement. En particulier les caractéristiques sociologiques, qui exercent sur les données techniques et les conditions économiques une influence certaine, seront prises en considération. Ainsi les perspectives démographiques renseigneront sur les disponibilités en main d'oeuvre; l'agrément des zones résidentielles et les équipements culturels et touristiques donneront une indication sur la possibilité de faire venir des cadres et sur le montant de leur rémunération future; le budget local et les équipements à prévoir souligneront la tendance des impôts, etc. Enfin et surtout les vues des dirigeants et des responsables seront recueillies, analysées, sériées : pour l'essentiel, la réalité de demain retracera le rêve d'aujourd'hui.

Cet inventaire prospectif permettra de dégager les caractéristiques de l'agglomération considérée comme un complexe de structures d'accueil. Les éléments ainsi mis en lumière apparaîtront susceptibles d'orienter l'implantation d'industries nouvelles. Ainsi la présence de main d'oeuvre qualifiée évoquera la possibilité d'installer un fabricant de machines; la proximité d'un marché celle d'implanter un atelier d'emboutissage; des disponibilités en bois et eau pourront conduire à localiser une papeterie auprès de ces matières premières etc.

Une première sélection étant de la sorte opérée, il conviendra pour les branches retenues de préciser l'ordre de grandeur de leur développement possible, dans la localité, au cours des dix années à venir. A cet effet on dégagera leur évolution probable à l'échelon national, pour la période de temps examinée, d'après les prévisions du plan national et les perspectives de la profession. Puis sera déterminé le pourcentage de cette expansion susceptible d'intéresser l'agglomération, en tenant compte de la nature et de l'intensité des éléments d'orientation ci-dessus définis, pour la collectivité et pour les autres villes ou régions intéressées, le tout dans une optique prospective.

Il conviendra par la suite, pour les branches et les capacités sélectionnées, d'établir des budgets prévisionnels d'exploitation dans l'agglomération et dans les principales cités concurrentes. Pour simplifier il sera possible de s'en tenir aux éléments les plus caractéristiques. Ces analyses conduiront à l'établissement d'une liste des industries susceptibles d'être implantées dans la collectivité examinée. Ce document, qui rappellera les capacités de production, pourra être dressé par ordre d'avantage décroissant, afin de faciliter les éliminations dont la suite des études pourrait faire apparaître la nécessité. En effet on aura soin de s'assurer tout d'abord qu'il n'existe aucun goulot d'étranglement, en particulier de la part de la main d'oeuvre, de la formation professionnelle, du logement et des investissements publics. Le cas échéant un programme d'équipements privés et publics sera établi en vue de remédier aux carences constatées. Un tel plan sera d'ailleurs toujours utile, sinon indispensable, pour coordonner et synchroniser les opérations nécessaires. Il aura des répercussions sur le budget et les impôts locaux, voire sur les possibilités de financement industriel et sur les taux d'intérêt, sinon sur les coûts de construction, les disponibilités et le prix de la main d'oeuvre. On procédera donc dans les prévisions aux rectifications nécessaires. Il n'est d'ailleurs pas exclu qu'au dessous d'un certain niveau d'équipement, les dépenses liées aux opérations nécessaires ne soient prohibitives, ou que les incidences techniques et économiques de ces travaux ne soient de nature à écarter toute possibilité d'industrialisation dans un avenir prévisible. Mais, si tel n'est pas le cas, les études ainsi conduites doivent, à ce stade, autoriser la phase des réalisations.

L'aménagement des zones industrielles.

Il convient en premier lieu de calculer les surfaces de terrains correspondant aux implantations prévisibles, telles qu'elles viennent d'être établies. Les superficies nécessaires varient de la plus large manière selon les branches industrielles, le degré d'évolution des collectivités considérées, les perspectives d'expansion, la taille unitaire des entreprises etc. C'est pourquoi au lieu de transposer, après une correction plus ou moins arbitraire, l'expérience des industries déjà en place, ou a fortiori celle des pays étrangers, on jugera sans doute préférable de se livrer en l'espèce à une étude d'engineering. Cette dernière aura pour objet de calculer par type d'usine les surfaces nécessaires aux différentes fonctions à savoir : transport, stockage, production, surveillance, services d'études, comptabilité, services commerciaux, services du personnel, direction générale, locaux mis à la disposition des employés, services annexes, accueil des visiteurs, parkings, réserves pour les extensions prévisibles, mise en valeur des espaces verts, dégagements internes et externes.

Les superficies ainsi obtenues par branche d'activité seront confrontées aux terrains disponibles, c'est-à-dire susceptibles d'être équipés pour les industries à des prix non prohibitifs. A cette fin, les budgets prévisionnels d'exploitation déjà établis seront complétés par l'incidence des charges foncières sur les fonctionnements annuels. Il aura donc été nécessaire de chiffrer, au moins d'une manière approximative, le coût des terrains aménagés. On observera à cet égard que les dépenses d'équipement varient en fonction inverse de la dimension unitaire des lots. En particulier si la profondeur des parcelles individuelles diminue de moitié, le prix de l'aménagement par mètre carré augmente de 50%. C'est pourquoi souvent la rareté physique des zones utilisables, ou le coût de leur achat et de leur mise en état, conduiront à éliminer les branches les moins avantagées par les localisations étudiées ou les usines les plus modestes. Les analyses de fonctionnements comparés auxquelles il sera, dans ce but, procédé mettront en évidence les activités qui seront plus favorisées dans d'autres agglomérations et celles qui, le cas échéant malgré la valeur élevée des terrains équipés, trouveront dans la collectivité examinée, leur implantation optimale. Au demeurant les zones aménagées pourront être recédées aux utilisateurs à un prix inférieur à leur coût réel. En tout état de cause, ces recherches supposeront réparties les usines à implanter entre les terrains de la localité étudiée. Il sera tenu compte, pour cette micro-localisation, des impératifs urbanistiques tels que la direction des vents dominants, les nuisances, la proximité des zones résidentielles etc. Également les facteurs économiques seront pris en considération : relations inter-industries, problèmes de transport pour le personnel, les matières premières et les produits terminés, possibilités de services communs, incidence des dépenses foncières sur les avantages liés à la localisation dans la communauté. En règle générale, on cherchera s'il convient de maximiser les ouvertures d'entreprises, à installer sur les terrains les moins attrayants les firmes les plus favorisées par leur implantation dans la collectivité.

Il conviendra donc d'édicter pour l'utilisation de chaque zone industrielle une réglementation technique précise : productions autorisées, aspect, emplacement et hauteur des constructions, nuisances, parkings, espaces verts etc. Ainsi non seulement les intérêts des riverains seront-ils respectés, mais encore ceux de l'ensemble des usines installées dans les zones. De même que l'harmonie des nouvelles industries aux possibilités et aux besoins du site et des hommes a été recherchée par les études préliminaires, l'équilibre de ces activités entre elles, et avec leur environnement immédiat, sera obtenu par une réglementation stricte de leurs conditions de fonctionnement. Les industriels doivent comprendre que ces restrictions ont pour seul objet de faciliter leur exploitation. Au surplus, des services communs pourront être prévus en faveur des usagers ou de leur personnel : construction des bâtiments, entretien, chauffage, restaurants, activités sociales, laboratoires, bibliothèques etc. Les zones industrielles devraient être, à l'heure actuelle des endroits agréables parce que bien équipés : le personnel et les employeurs y trouveraient chacun leur avantage.

Conclusion

L'organisation des zones industrielles implique un double élargissement des études nécessaires. Afin de déterminer, préalablement à toute réalisation, les branches qui trouveront, dans la localisation considérée, leur implantation optimale, il est indispensable de procéder à des analyses comparées, en tenant compte des agglomérations concurrentes. C'est pourquoi ces recherches ne peuvent être effectuées que par des organismes, privés ou publics, intervenant à l'échelle nationale. Enfin elles ne sauraient être limitées aux seuls terrains industriels mais elles doivent aboutir à l'élaboration d'un programme d'équipement pour la communauté étudiée, qui tienne compte de l'ensemble des investissements généraux, sociaux, scolaires, hospitaliers, touristiques, etc, paraissant indispensables à la venue des industries, pour peu que l'on envisage cette dernière dans une vue prospective.

1235 F - Oct.1962 - 1,000

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

E/CONF.39/D/130
SUMMARY
12 Nov.1962
ENGLISH
ORIGINAL : FRENCH

SUMMARY

Agenda Item: D

France

THE ORGANIZATION OF INDUSTRIAL ZONES

By Paul Henri DAVID,
Inspector,
Ministry of Construction

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

THE ORGANIZATION OF INDUSTRIAL ZONES

By
PAUL HENRI DAVID,
INSPECTOR,
MINISTRY OF CONSTRUCTION.

SUMMARY

The organisation of zones destined to accommodate new industries is of great interest for the economic development of communities. Contractors are attracted by the minimizing of costs and delays and removal of red-tape and clerical work allowed by these new measures. Communities may select the activities best suited to the possibilities and needs of their members. Between the two sides, a balance is established, which is a token of durability. This is particularly important for countries in process of development.

However, the planning of industrial zones should be illuminated by accurate analyses. These investigations will make it possible to steer clear of political considerations, pressure groups, or haphazard measures.

Preliminary studies for the planning of industrial zones

These aim to bring to light factors which may influence the location of new industries in the centres under survey. These factors are of different categories:

Technical: 1. Climatology: temperatures, precipitation, hydrometry.

2. Local raw material: produce of soil and sub-soil, industrial products and services.

3. Geographical position in relation to the principal raw materials for industry.

4. Means of transport, by road, railway, waterway and air.

5. Labour: availability in number and in quality.

6. Power: electricity, gas, petroleum products.
7. Water: drinking and industrial.
8. Possibilities of treatment of residues, solid and liquid.
9. Public services: fire fighting, police, public warehouses, etc.

Economic:

1. Local markets.
2. Geographic position in relation to main markets.
3. Cost of transport by road, railway, waterway and air.
4. Wages per trade.
5. Unit rate for power.
6. Water rate.
7. Cost of residue treatment.
8. Cost of insurances.
9. Local taxation.
10. Cost of industrial services.
11. Building costs.
12. Local financing possibilities.
13. Actual rates of interest allowed by local lenders.

A large number of these data are themselves the reflection of sociological factors which should be analysed: demography, attitude of the community towards the industrialists, structure of existing industries, experience of local contractors, relation between capital and labour, housing, amenities of residential zones, cost of living, local budget, health, social, cultural, commercial and touristic services.

It is advisable, moreover, to extrapolate the results of these researches onto a foreseeable future, covering about ten years. For this, government plans and projects will be used, as well as estimates made by Companies concerned, the sociological observations referred to above and, mainly, the views of the leaders and those in authority.

Thus will emerge the factors capable of influencing the planning of industrial sites: for instance: the availability of qualified labour may make it possible to manufacture machinery, the proximity of markets may mean the installation of a bottling plant and the availability of timber and water may influence the siting of a paper mill, etc. After this preliminary choice, it will be necessary to define the magnitude of the possible development, within the district, of the industries thus chosen. For this purpose, the national prospects should be weighed by consideration of the proportion of the planning factors referred to above,

within the community, in relation to the other cities or regions under review. Thus, for the branches and production capacities selected, estimates could be prepared for the community under analysis and for the principal competing towns. This will allow for the compilation of a list showing, in decreasing order of merit, the industries which could be introduced in the locality.

If some bottlenecks appear as to vocational training, housing or public investments, an amenities programme will be planned Such a plan is, anyhow, always useful, if not essential, for synchronizing the necessary operations. It should clearly define its incidence on local taxation, financing possibilities and labour. All these investigations will lead to the stage when plans can be put into practice.

Planning of industrial zones:

First should be defined the land areas suitable for the prospective industries. Rather than transpose more or less arbitrarily the experience of already-established industries, it will be preferable to compute, for each type of factory, the area necessary for its different activities: transport, storage, production, etc.

The areas thus computed will be compared to the land available for factory construction at non-prohibitive prices. To this end, to the estimates already calculated must be added the incidence of the land rents on the annual general charges. These analyses will bring to light the activities best-suited to the community under consideration. They will have necessitated the computing, at least approximately, of the cost of the zones already equipped and the distribution of the factories among them. For this micro-localization urban requirements should be kept in mind, such as prevailing winds and nuisances; economic factors, such as inter-industrial relations, transport, and services. Generally, the least attractive sites will be offered to those firms which will be most favoured by their introduction to the locality.

It will be necessary to enact definite by-laws for the utilization of each zone: industries authorized, aspect, site, and height of structures, car parks, green spaces, etc. Thus, the interests of residents and of all users will be protected. Further, it will be possible to plan common services: construction of buildings, maintenance, heating, social activities, etc.

Conclusion

A twofold survey appears necessary. In order to specify the branches which will have their optimum site in the district under consideration, it is advisable to proceed by comparative analyses: i.e. to entrust an organisation, private or public, which will intervene in this study on a national scale. Finally, as these researches cannot be confined to industrial lands alone, they must lead to a general programme of amenities for the community under survey.

S - 1235 F - Nov.1962 - 1,600

E/CONF.39/D/131
25 Oct.1962
ORIGINAL : ENGLISH

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

Agenda Item: D.2.2

Yugoslavia

THE LOCATION OF INDUSTRY IN UNDERDEVELOPED AREAS

By Branko ČOLANOVIĆ,
Director, Institute for Industrial Economics,
Belgrade

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

THE LOCATION OF INDUSTRY IN UNDERDEVELOPED AREAS

By Branko ČOLANOVIĆ

Director, Institute for Industrial Economics, Belgrade

1. Some General Principles

A considerable period has elapsed since the time of Jochann Heinrich von Thünen, but the economic singificance of space has not ceased to grow. The overcoming of distances made possible by the vertiginous pace of technology and revolutionary social emancipation has enabled each individual region to valorize its specific potentials in as complementary as possible entaties. It has been providing a strong impetus for two basic tendencies of rational production - specialization and integration - and has also by fostering the incessant impulse of reaching the others resulted in growing labour productivity and a steady widening of markets. Regional aspects have imposed themselves as the primary component of contemporary economic development.

G. Palombe's definition "development is the gradual and temporally continued growth of national monetary income per capita"[1] cannot be satisfactory. It conceals the untenability of regional contrasts and the lack of movements towards new social formations. It also does not take into account space as an active factor of economic growth.

The location of industry can nowadays be considered only from the viewpoint of the optimum development of the whole. The micro-analyses of the individual location of an industrial undertaking does not, of course, lose anything of its content, it has now even become more subtle than ever before, but it must start from the functional relationships towards the whole. This functional relationship is even more important for less-developed areas, no matter whether we take the conventional approach to the problem of location, considering the selection of an appropriate space for a certain industry, or its exact opposite - as it has, for instance, been done by R. Pré[2] - considering the selection of an industry for a certain space.

There is no qualitative distinction in the application of the general functional principle in the location of industry between a homogenously underdeveloped country and an underdeveloped region (within a country). In both cases macro-adequate location is a direct prerequisite for speedy growth, and in the case of underdeveloped regions it also contributes to the efforts of the developed ones in assisting them. The practical orientations, to use Weber's well-known term, are mainly the same in both cases.

---

1) Giuseppe Palomba, "Nuovi e vecchi interrogativi intorno alla realtà dello sviluppo economico" published in the series "Gli aspetti sociali dello sviluppo economico", Milano, 1961.

2) Roland Pré, "The Location of Industry", paper presented at the Second Study Conference of the OECE on the Problems of Economic Development, Madrid, 1961.

The first of them naturally refers to the reaching of maximum accumulation and of its effectiveness. The new industry should, in the first place, exert a minimum pressure on the national accumulation and it should, moreover, once it had been constructed, supply the national accumulation with as large as possible provisions. The choice of the location will be justified if it enables the lowest possible direct investments per capacity unit and, in particular, minimum additional investments concerning the infra-structure, non-economic activities and housing projects. In connection with the degression of investment costs, priority should be given to locations whose highly concentrated raw material or power supplies constitute a basis for the establishment of as large as possible production capacities. The complex exploitation of the raw material substance can also constitute a significant motive in this direction. Rationalization resulting from construction undertaken on sites provided with large quantities of available building material should not be underestimated either. On the other hand, unnecessary surplus investments need not be the only factor having a negative effect on accumulation. Location unfavourably selected as far as raw material or power supplies and consumption centers are concerned, provided even that the existing infra-structure elements (transport, long distance mains, et al.) are of sufficient capacity, has the same effect as it results in comparatively increased production costs.

Owing to the fact that the problem of agriculture in the process of the accelerated industrialization of underdeveloped areas has become increasingly more acute, it is important to have an appropriate layout of the industry organically connected to agriculture represent an as effective as possible incentive for its further development. Industrial activities absorbing agricultural raw materials will rightly have to be developed in areas of strong agricultural production not only owing to the economy of transport, the reducing of damages of the material during transport, and handling to a minimum and the opportunity for the complex use of raw materials and refuse, but also owing to the advantages resulting from organizational business integration of industry and agriculture (combined industrial and agricultural concerns and other forms) in order to bring about the highest possible rate of efficiency and economy for the entire production and processing cycle of agricultural products. Likewise industrial activities providing agriculture with machinery and chemicals will mostly contribute to its modernization and the radical increase of agricultural crops, if located in the very centre of agricultural areas. It is there that they provide the best safeguards for a rational organization of the very important lashe maintainence services of agricultural machinery and implements, those for the distribution and mixing of fertilizers and of livestock fodder, et al.

The third important question of industrial location is connected with the balance of payment. The problem of balance of payment in foreign trade exchange is increasing just as the underdeveloped area is developing its own industry, for, on the one hand, the growing income of the population and the increased capacity of the industry are more and more absorbing the export surpluses of food and agricultural raw materials, and on the other industrialization is steadily increasing the demands for imports of machinery and reproduction materials. Thus, during a comparatively long development stage, the threats of an unbalanced foreign exchange are constantly remaining open and it is therefore not immaterial what the relationship of the location of industry is to that problem. It is obviously already indirectly alleviated by the favourable effects on the development of agriculture and on its capacity of being as active as possible in its foreing exchange balance resulting from properly selected location. Other advantages might be brought about if industry oriented to the export market is constructed on points favouring its competitive capacity on foreing markets in connection with transport costs, available power resources, productivity and skilled manpower, et al.; or if it is constructed on points where the opportunities for the integral use of raw materials and refuse contribute to savings in foreign currency intended for imports.

The lack of skilled personnel constitutes, as a rule, a considerable deficiency of underdeveloped areas. A proper policy of location will endavour to safeguard as much as possible the most effective use of distinguished highly skilled technical, commercial and, in particular, administrative personnel. This means for a large number of industrial activities practically construction within the framework of large urban agglomerations - particularly for those comprising complex technological manufacturing procedures, as well as for those which owing to their being oriented to the export market are subjected to severe international competition. It is there that numerous institutions of higher learning, research institutes, designing bureaus, various services, et al. provide much greater opportunities for the training and promotion of highly skilled personnel, the adequate preparation of the manufacturing programme, and efficient business representation. They also provide the best conditions for organizing the vitally important development research activities which have been proved by experience to appear as a strong tool to alleviate the serious foreign exchange problem in a period of general economic growth of underdeveloped countries by securing their own technological solutions, to substitute those coming from abroad, and by their emancipation from excessive imports of foreign reproduction materials.

As it can be easily seen, all these "orientations" do not represent pure, specific motives of industrial location in underdeveloped areas. They are, in addition to others, the principles of location in general. They have been stressed here owing to the higher meaning provided to them by the functional relationship with the main and regular problems of development of underdevbloped areas[3].

The specific motives arise out of the indispensability of changing the structure of the economy and of the population. It is possible that transformation cannot be carried out radically with sufficient speed and the necessary width if the national policy of location makes use only of the immediate economic effects. The already constructed industry, the stronger infra-structure and greater availability of technical institutions and experts in the more developed regions will in such a case decisively absorb the results of the new industrialisation, making the polarization of regional development even more acute, particularly if owing to certain reasons it is not possible to reach a satisfactory level of manpower mobility. The overcoming of the profound dualism in countries the developed regions of which are characterized by strong market economies, a large percentage of non-agricultural population and high per capita incomes, and the underdeveloped ones by a purely natural economy and agricultural overpopulation, is, however, in the long run as economic rather than a socio-political process. In the end, it will result in the general growth of social productivity and employment and in the maximum widening of the home market taking equally into account the interests of all parts of the country.

The policy of industrial location in underdeveloped areas, appearing even with new motives on behalf of these interests, can accordingly in a certain stage find itself facing a dilemma between immediate and long term economic effects. Temporary concessions are necessary for both directions, to have the intensity of efforts in underdeveloped regions either lowered or increased. What is essential, however, is to have and to consistently observe a long term plan of industrialisation of underdeveloped regions and to have the general policy of industrial location strictly follow its tendency.

It is here that a particularly important principle of locational policy in underdeveloped areas, more or less generally accepted, but often ignored in practice, should be remembered. The arbitrary dispersion of the industry

3) A synthetic presentation of these problems is provided by K. Martin's paper "The Economic Basis of Industrial Development" presented at the Second E.P.A. (O.E.E.C.) Conference Madrid, 1961.

along the entire surface of the area, in every backward commune or town, is a frequent deficiency of the industrial development of underdeveloped areas, usually arising out of lack of resistence to socio-political pressures. The principle of selective concentration of industrial development in certain centers is, however, supported by all economic reasons.

The "Method" of filling up all vacancies in the area by the construction of plants turns out sooner or later to be a serious brake in the development of the entire underdeveloped region owing to the globally uneconomic use of resources. Horror vacui applies to the movement of industry in space, just as well as to water in ancient physics. The extent taken up by a centre of industrialization is immaterial just as well as its relationship to the momentary administrative and territorial division; what is essential, however, is to utilize all the advantages of concentrated construction, obviously with certain reserves towards excessive urbanization.

2. From Weber up to the present day

As a conclusion the following elements can be taken:(a)an active relationship of economic policy towards the locations of industry is indispensable; (b) the first approach has to be macro-economic with all the general, as well as with the specific motives of industrial location; (c) micro-criteria maintain their full significance only in accordance with the postulates of the general economic policy of location.

It is hardly necessary to emphasize that only a fully and rationally directed mobility of the means provided by collective ownership and the planned economy built on it can produce the conditions required to reach these objectives. Contemporary trends are more and more going along this line, and an intense industrialization of underdeveloped areas has been properly started only where these conditions have at least partly been met[4].

It is likewise only from these aspects that the relevance and validity of the contributions provided by the substantial scientific activity referring to the problem of location carried out so far can be properly evaluated. It is also necessary to make allowances for the classical conceptions marked, out of obvious reasons, by the time and setting in which they had arisen. In the present-day period of irrepressible intergovernmental economic integration von Thünen's study of "the isolated state", Weber's investigation of the orientation for the selection of the most favourable location for the establishment of an industrial undertaking in "an isolated imaginary economic area",and Palander's[5] consideration of the whole process of formation of prices and location of industry within an "isolated state" must sound somewhat anachronistic;it was owing to that, as well as to some other reasons, that they were not able to envisage the tremendous role of the international division of labour as a locational factor. Or, similarly, if Weber, Palander and others have not realized the equally great significance of monopoly in the lay-out of production, the more so are their approaches removed from the contemporary are of collective (or "public") ownership.

---

4) First of all, in countries with fully socialized means of production and planning including the entire economic activity, then in some recently emmerging countries of Africa and Asia as well as in those western countries where a strongly developed cestor of state ownership in the economy makes at least a partial application of planning methods possible.

5) Von Thünen s main work "Der Isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie" published in 1826, Weber "Uber den Standort der Industrien" 1909, Palander, "Beiträge zur Standortstheorie", 1935.

August Lösch[6] obviously seems to be considerably nearer in his approach, not so much because of his numerous remarks directed to Weber and his correct appreciation of the determining effect of profit on the lay-out of capitalist production, but rather owing to his unequivocal attitude to the general theory of location having to be approached only from the aspect of the economy of the country as a whole. This concept is still firmly established at present, and has, naturally, been most consistently expressed in the works of Fejgin, Kantorović et al., taking collective ownership over the means of production and a fully developed system of economic planning as the basis.

In the afore-mentioned paper, R. Pré places the whole problem of the location of industry in an underdeveloped area first of all in a functional relationship to its possible type and volume of foreign trade exchange. Fejgin quite rightly indicates some new correlations between the lay-out of production and the great achievments of contemporary technology, i.e., electrification, mechanisation, chemisation, the use of nuclear energy, et al.[7] The general theory of location has to be considered from a dynamic point of view.

It only remains to fill the gap in the theory of location as far as the specific framework of underdeveloped areas is concerned. Fragmentary contributions have become more numerous ever since S.R. Dennison's[8] pioneering contribution, but the size of the world's underdeveloped areas, the state of their economies and the urgency of the entire problem of theory of their speedy emancipation require the elaboration of a consistent theory of location in underdeveloped areas. It would have to be built on the new basis of material and social progress, without the anti-historicisms adopted, almost as a rule, by the scientists of the classic type. After having evaluated the behaviour and validity of "normal" locational "orientations" in the specific conditions of underdeveloped areas, it would study and define the specific motives of the lay-out of production in them.

Special attention should be paid to the quantitative, and possibly also qualitative, differentiation of locational problems concerning an underdeveloped country and an underdeveloped region, taking, however, the national and intergovernmental integrational processes fully into acount. The clash of the immediate and the long-term motives of locational policy conducted by a country in its more backward regions, in a certain stage, is an important field of research and clarification. The fundamental consideration of numerous practical problems, e.g. methods of concentration, selection of industrial activities for underdeveloped areas, adequate size of production capacities, etc., also cannot be avoided.

It is only in the full macro-aspect, with a horizon covering the locational interests of the whole, that the methods of micro-determination can be effectively used and valorized. Both the old and new routine procedures are very numerous and they can be used in accordance with the given specific conditions. If it is, for instance, the case of "transport orientation", it would certainly by unjustified to disregard the results that can be obtained by the critical application of Launhardt's locational triangle, or Polander's mechanical model, or Weber's isodopans, or Predöl's principle of substitution, et al., in determining the concrete location of an industrial undertaking within the framework of the national and regional economic plan. Moreover, it is only by dint of the exact

---

6) The firs edition of Lösch's "The Economies of Location" was published in 1939, and the second in 1943.

7) J.G. Fejgin, "Razmeščenie proizvodstva pri kapitalizme i socializme", Moscow, 1958.

8) S.R. Dennison, "The Location of Industry and the Depressed Areas", Oxford, 1939.

methods of micro-treatment that all the advantages of the priority of the macro-approach can be fully utilized.

We should, however, bear in mind Lösch's cautious statement that theory can serve for the selection of the region in which the locational point for a new industrial undertaking can be looked for, rather than for the determining of the point itself.

3. Brief Survey of Yugoslav Experience

Underdeveloped areas constitute a considerable part of Yugoslavia, but the officially determined border has several times been modified in the course of the post-war period, depending on the existing opportunities for special economic intervention. The area determined as underdeveloped according to the Federal Five Year Plan 1961 - 1965 includes the People's Republics of Macedonia and Montenegro as well as the large southern parts of the People's Republics of Serbia, Croatia and Bosnia and Herzegovina. An area of 105,450 square kilometres (approx. 41 percent of the national territory) is inhabited by a population of 6.2 million (approx. 1/3 of the entire population), their national income per capita amounting, in 1960, to about 45 percent of the per capita income in the more developed areas. In the same year, 1960., there were 825 industrial plants, predominantly tied to the local sources of raw materials, operating in the under developed area. The majority of them represent plants for the processing of agricultural produce (food and tobacco, 175), they are followed by the non-metal and construction material industries (163), as well as by the wood industry (135). These activities account for 57 percent of the entire industry in the underdeveloped area.

Roughly speaking, however, the genuinely underdeveloped regions mainly overlap with the area lying southwards from the line Sava-Danube[9]. This area includes 2/3 of the entire Yugoslav agricultural population and a very considerable part of the national raw material resources (metals, non-metals, wood, energy sources, agricultural raw materials), thus constituting the main basis for the further industrialization of the country. Owing to these as well as to some other reasons, the accelerated economic development in the underdeveloped regions has been the omnipresent motive of our postwar efforts, and our seventeen year experience can also be instructive for others.

The following brief characterization of the Yugoslav relationship to the industrialization of underdeveloped regions seems to be justified: (a) a constantly active attitude; (b) the presence of the macro-approach; (c) the absence of a specific locational conception for underdeveloped areas; (d) methodological insufficiency of micro-treatment.

The first two characteristics need not be considered here. Their positive quality has marked the whole relationship and has more than offset the deficiences that have been expressed. The dimensions, modalities, and trends of intervention have always more or less expressed the balanced functional relation ship towards the entire economy of the country, and particularly in the course of the last five years efforts have become comparatively more significant as to their volume, and being more directed to the processing and refining industries, they are more appropriate in quality. The problems are mainly connected with the latter two characteristics, referring, in fact, to the very subject-matter of this modest contribution.

---

9) In the area south of the Sava-Danube line every 1,000 square kilometres account for 8.7 industrial undertakings, as compared to 28.2 in the north, and 13.5 undertakings per each 100,000 inhabitants, as compared to 31.2 north of the Sava and the Danube (These estimates are based on" Adresar industrije FNRJ 1960").

A specific locational conception would have to be an appreciable contribution to the raising of the general effect of central government intervention in underdeveloped areas, and it would obviously also have a favourable impact on the evolution of the general industrial structure of the country. In order to establish it, it is necessary to define all its essential components.

The first of them referrs to the regional specialization of industrial development and to the composition of activities the capacities of which are growing in individual regions. This composition is in certain cases irrationally heterogenous, thus having developed areas and even large urban agglomerations crowded with activities engaged in basic products, semi-finished articles, et al., which would from the locational point of view be much more appropriate for the underdeveloped regions, particularly as far as the raw material resources are concerned. In the opposite case, however, it is much more difficult and timeconsuming for the underdeveloped regions to reach a full degree of efficiency in dealing with complex technological procedures in some undertakings for the satisfactory work of which they could not even realistically expect to provide all the necessary conditions.

The second component would deal with the determining of the focal points of industrial development in underdeveloped areas. The almost complete territorial diffusion of construction in certain regions has soon shown its reverse side, synthetized in a very low general capital coefficient. The more recent trends are more and more tending towards guided concentration of industrialization in places found by thoroughly and scientifically conducted analyses to be appropriate for it, but it still remains for the plans and instruments of economic policy to adopt such a trend.

The third basic component refers to the relationship between the location and the market. Provided that we can take "location and trade to be the two sides of the same coin"[10], this link has to be fully materialized in the shortest possible time, which on the one hand means the thorough methodological study of the relationship between the size of the plant and the market, and on the other the consistency of the provisions of economic policy on all its levels in order to have a location established by exact methodology reach its full market affirmation in the shortest possible time. There are, however, still considerable problems to be handled on both sides.

Conditions for the implementation of a specific locational concept for underdeveloped areas can be provided by the introduction of long-term planning, the overcoming of the global quality of the plans and the improvement of the investment system. The medium period (e.g., 5 or 7 years) cannot bring about qualitative changes in the industrial development of backward areas, and it is just such changes that have to be envisaged and defined in the (long-term) plans. The global approach is appropriate for the setting of proportions in the general economic balance sheets, but it does not represent a basis for the necessary programme work. If the almost extreme intensity of investment initiative obviously represents a positive achievment of the Yugoslav investment system, the problem of directing the investments to the most appropriate industrial and territorial structure has still not been fully resolved.

Improvements are also necessary in the field of methodology of micro-treatment. The institution of investment tenders could have been justified in the initial period as it was just intended to encourage initiative and competition; it has also provided corresponding results. From the locational aspect, however, the contribution has not been very considerable. Only the locations proposed by the participants in the competition for the new plant, the subject of the tender, are compared, without considering systematically all the factors providing an objectively most appropriate location. In addition, the number of economic indi-

10) Walter Isard, "Location and Space-Economy", New York, 1956, p.6.

cators considered to be relevant (so far in most cases only the rate of return and the foreign exchange effect) is not entirely satisfactory. Its increase would bring about considerable difficulties in analyticaly equalizing the practical content indicators of a composity which had not been drafted and designed by the various potential investors after the same technique. The former method of the so-called guaranteed investments, within the federal competence, determining the size and location of each industrial undertaking to be established in an underdeveloped area, was in a position to provide for the application of an exact locational methodology. The new institutional evolution is requirg new methods which would have to be in a position to ensure the same end.

In addition, it has become obvious that it is necessary to have more technical organizations able to deal with the scientific and methodological consideration of micro-location in practical work than it has been the case so far. Some of them have been established only recently.

By resolving these and some other problems, the already considerable results recorded in the development of underdeveloped areas in Yugoslavia so far could be even more enhanced.

1222 E - Oct.1962 - 1,600

E/CONF.39/D/131
SUMMARY
25 Oct.1962
ORIGINAL : ENGLISH

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

SUMMARY

Agenda Item: D.2.2

Yugoslavia

THE LOCATION OF INDUSTRY IN UNDERDEVELOPED AREAS

By Branko ČOLANOVIĆ, Director,
Institute for Industrial Economics,
Belgrade

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

THE LOCATION OF INDUSTRY IN UNDERDEVELOPED AREAS

Regional aspects have become the primary component of the present-day economic development, and the location of industry can nowadays be considered only from the viewpoint of the optimum development of the whole. This functional relationship is even more necessary for the less-developed areas, bearing in mind the well-known elementary problems regularly accompanying their industrial emancipation. The first is the reaching of the maximum accumulation and of its effectiveness followed by the problems of agriculture, the lack of technical personnel, and that of an unsatisfactory balance of payments. The right locational policy would alleviate the severity of these problems.

The specific motives of locational policy arise out of the necessity to change the structure of the economy and of the population. This long-term objective has often to be set before the immediate economic effects, which can in a certain stage create differences between the developed and less-developed regions of a country. It is, however, essential to consistently, deliberately observe the long-term plan of the industrialization of less-developed regions.

An uncontrolled spacial dispersion of construcion is negative. The principle of selective concentration of industrialization in certain centres is backed by all economic reasons.

It is the social ownership of the means of production and the planned economy based on it that provide all the conditions to bring about an optimum locational policy. Contemporary trends tending to run more and more along that line, the antihistorical attitude of the majority of the representatives of the locational theory of the classical type appears to be even more anachronistic. The dynamic approach is the only proper approach to the general theory of location; it is, however, still necessary to fill the gap in the theory of location referring to the specific framework of underdeveloped areas.

It is only in the full macro-aspect that the methods of micro-determination of the location of an industrial enterprise can be efficiently used and valorized.

Yugoslav experience can be of interest both owing to the size of its underdeveloped regions and the extent to which they are backward as well as owing to the general positive attitude to their speedy industrialization and to problems recorded in the field of locational policy. These problems refer to the defficiency of a specific locational concept concerning underdeveloped areas as well as to the methodology of micro-treatment. Regional specialization, the envisaging of centers for the concentration of industrial development, and the safeguarding of links between the new location and the market represent the basic methods of dealing with this problem. The stipulations necessary to make this possible can be met by the introduction of long-term planning, the overcoming of the global quality of the plans and the improvement of the investment system.

S - 1222 E - Oct.1962 - 1,600

E/CONF.39/D/132
15 Jan.1963
ENGLISH
ORIGINAL : RUSSIAN

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

Agenda Item : D

Mongolian People's Republic

INDUSTRIAL DEVELOPMENT IN THE MONGOLIAN PEOPLE'S REPUBLIC

By L. GURZHAV

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

INDUSTRIAL DEVELOPMENT IN THE MONGOLIAN PEOPLE'S REPUBLIC

by L. Gurzhav

1. Basic trends in the harnessing of natural resources in the contemporary phase of the history of Mongolia

After the victorious revolution of 1921 there arose the problem of the continuous development of all essential branches of public production, such as: (a) mechanized industrial production, (b) improved cattle-breeding together with the introduction of up-to-date scientific and technical methods (veterinary science, zootechnics, etc) and an agriculture based on mechanization and agronomy, (c) other branches of a modern economy, like transport, telecommunications, etc;

Our sociologists have laid the following considered factors at the basis of the creation and development of a modern industry in our country: (a) the enduring nature of government by the people set up by the revolution and the pursuit by this government of independent policies in the national interest; (b) eradication of the feudal social structure existing formerly in our country; (c) liberation from the influence of mercantile and usurious foreign capital; (d) economic cooperation with other countries on the basis of equality and mutual profits as well as the assistance extended by them, and first and foremost by the Soviet Union; (d) exploitation of our boundless natural resources.

2. Results achieved by national policies in the field of industrial development

The favourable conditions created by the national policies of the people's government made it possible to develop with succes the industrialization of the national economy; in other words, a modern industrial production emerged as an independent and leading branch of the national economy.

With the growth of our economic strength, the government channelled annually increasing allocations into the creation of new industrial undertakings. In 1941-1945, the government

invested in the industry 40.5 million tugriks; in 1946-1950 - 32.6 million tugriks; in 1951-1955 - 109.9 million tugriks; in 1956-1960 - 345.4 million tugriks, and in 1961 - 141.8 million tugriks. Substantial capital investments were made additionally possible under credits and assistance extended to us by the USSR, the Chinese People's Republic, Czechoslovakia, the German Democratic Republic, and others. These investments amounted from 1953 to 1961 to almost 2.2 billion tugriks.

In 1961, the gross industrial production amounted to 701.0 million tugriks, or an increase of 9.1 times in annual production against 1940, and an increase of 3.8 times against 1952. With each period of industrial development, its specific share of the total industrial and agricultural product was continually increasing. This is clearly shown by the sustained high rates of growth of industrial output compared to agriculture, although crop-production is developing fairly rapidly.

At present, this new type of activity for our country, i.e. industry, is manufacturing a wide range of products which cover the demand of the national economy and our population and are also exported. The output of certain basic products may be found in the table hereunder:

(Output in 1961)

	Product	Measured in	Output
1.	Electric power	million kwh	156.0
2.	Coal	thousand tons	754.5
3.	Oil	thousand tons	26.1
4.	Gasoline	thousand tons	17.4
5.	Wolframite	tons	346.6
6.	Fluorspar	thousand tons	38.1
7.	Workable wood	thousand cu. m.	383.2
8.	Bricks, tiles	thousand pieces	66.9
9.	Fabrics	thousand metres	399.3
10.	Tanned hides	thousand pieces	181.8
11.	Tanned skins	thousand pieces	1208.0
12.	Footwear (miscellaneous)	thousand pairs	1319.4
13.	Flour	thousand tons	51.7
14.	Meat	thousand tons	
15.	Whole milk	thousand litres	

The development of a modern industry transformed the exclusively cattle-breeding Mongolia into an agricultural and industrial country.

The creation and development of industry led to great general advancement, since science and technical knowledge found a constantly growing application in the working of the national economy. We now have a considerable number of works which are endowed with the most up-to-date equipment. We might mention undertakings like the Nalaikhinsk mines, thermal power stations, a number of building material factories (woodworking mills), big banks, etc.; an oil-refinery, an integrated leather and footwear production plant, an integrated weaving mill, clothes factories, several food-processing plants (dairy, confectionery, flour-mills, etc.). The technical level of equipment in these undertakings is not inferior to that of similar plants abroad. All basic operations and even some ancillary ones are fully mechanized in the dairy and confectionery plants and in the flour-mills.

The degree of mechanization in some of our industrial plants, from the point of view of the specific share of mechanization of production processes, may be illustrated by the following figures: Ulan-Bator worsted mill - 71.9 %; Ulan-Bator hide tannery - 64.0 %; the glazed kid factory - 66.6 %; the footwear factory - 62.8 %; the wool-washing mill - 57 %, etc.

The industrial structure, divided by production items in 1961, may be seen from the table hereunder:

Industries	Gross production (in million tons)	Specific percentage
Total industrial output	701.0	100.0
1. Mining	93.3	13.3
2. Processing industries, including:	607.7	86.7
1) Production of electricity	51.6	7.4
2) Building materials	96.8	13.7
3) Woodworking	64.3	9.2
4) Leather and footwear	61.8	8.8
5) Woll-washing and textiles	45.7	6.5
6) Food-processing	189.6	27.1
7) Other industries	85.3	12.1

As a consequence of the creation of industries there emerged new gainfully occupied population groups - miners, construction workers, power industry workers, weavers, etc. In 1960, the labour force was divided by industries as follows: in the mining and oil industries - 9.4 % of the total industrial labour force; in the building material industry - 13.3 %; in the woodworking industry - 11.4 %; in textiles - 12.7 %; in the leather and footwear industry - 12.7 %; in the food-processing industry - 14.0 %, etc. With the differentiation of industries and the improvement of their technical level, the working population must constantly acquire new trades and new skills at the service of more advanced techniques. The industrial working class that emerged and developed with the process of industrial growth is becoming the leading group of the population which is learning to apply science and technology to public production. From 1940 to 1960, the number of workers and employees in the industry of the Mongolian People's Republic increased 2.4 times.

Our workers are successfully using modern equipment. This is proved by the following facts: the footwear factory built by the Czechoslovak Socialist Republic is now working even above its planned capacity. Various mills fitted out with the most modern technical equipment are attaining within the first 1 - 2 years their planned production capacities.

An eloquent proof of technical progress are the electrification of production and the general use of electric power in socio-cultural establishments and the domestic life of the population. As a result of the growth of the country's electrical equipment, the Ministry of Industry calculated in 1961 an electric power consumption of 2993 kwh. per workman.

Alongside with the erection of new industrial works, older plants are reconstructed with a view to receiving modern equipment and adopting new techniques which improve the rationalization of production.

Technical advancement, improved rationalization and the higher educational level of the workers together with their greater technical skill entail the continual growth of productivity. Thus, from 1957 to 1960, productivity in the Ulan-Bator integrated light-industry works (the plant was reconstructed during this period) increased 20.4 %;productivity increased 16.4 % in the undertakings belonging to the Ministry of Industry and 7.6 % in the plants of the Food-processing Ministry. It rose 22.5 % in the undertakings of the Industrial Cooperative Union. The increase in productivity for industry as a whole reached for this period 11.1 %. In 1961, the output per workman amounted to 122.8 % compared with the 1957 level.

Economic Cooperation with other countries proved to be the most important factor in the history of our industrialization. In view of its extreme economic underdevelopment, our country would never have been able to achieve an

appreciable industrial development within a relatively short period of time without outside help. Only economic cooperation with the Soviet Union made it possible to carry out industrialization and to liquidate the century-old technical and economic backwardness of our country.

Trade between our countries contributed to the utilization of our national income for industrial development. Trade with the USSR also ensured the necessary material prerequisites for the industrialization of the Mongolian People's Republic. The Soviet Union is supplying machines, machine parts, equipment, metals and other means of production.

Credits extended by the Soviet Union - preferential, bearing no interests, or at a low interest rate - were channelled into industrial development. These credit grants were not contingent on economic concessions on our part.

The Mongolian-Soviet joint-stock companies are built up on an unprecedented basis. When the Mongolian staff has acquired with the help of Soviet experts an adequate experience in the management of these companies, they are transferred into the ownership of the Mongolian people. This happened, e.g., in the case of the mines belonging to the company "Sovmongolmetal" (Soviet-Mongolian Metals). During the past decade (in the 'fifties) our country established multilateral economic connections with all People's Democracies and is trading with them on a mutually profitable basis. The Chinese People's Republic, Czechoslovakia, Hungary, Poland and the German Democratic Republic have built in our country a number of industrial works. Thus, e.g., Czechoslovakia has built a tannery, a sheepskin processing plant, clothes and footwear factories, etc. These plants are being gradually amortized.

The industrialization of our country is based on economic cooperation and mutual assistance between Socialist countries, which are a consequence of the international division of labour. At the same time, our country is increasing through industrial development its share of world production and contributes in this way to a better division of labour between countries.

3. The future of our industry

With a view to covering more fully the many-sided needs of our national economy and to increasing the welfare of our population, we must continue the development of our industry at an accelerated rate.

The task before the third five-year plan in the industrial field consists in assuring the advance growth of the fuel and power industries and that of the building industry on the

basis of a further expansion of the industrial processing of agricultural raw materials and the widest possible exploitation of our boundless natural resources.

Under the third five-year plan, the total industrial production should amount in 1965 to 1224.5 million tugriks. This will imply that the present output will be doubled in 1965, including the most important types of production. Thus, e.g., production of coal will increase 2.2 times; production of electric power - 3 times; extraction of rare-earth metal ores - 2 times; metal-working industry and repair works - 1.6 times; leather and footwear production - 1.6 times; textiles - 2.2 times; food processing - 2.2 times. The range of industrial production will also be greatly expanded.

Such results may be attained through the erection of new industrial plants, the technical overhaul of a number of older factories and the rationalization of existing production capacities. It is self-evident that the construction of new works and the overhauling of existing factories will require very considerable expenditure by the standards of our country.

Industrial capital investments during the third five-year plan will amount to 1.85 billion tugriks, or 39.8 % of the total national investments.

1329 E - Jan.1963 - 1,600

E/CONF.39/D/132
SUMMARY
2 Nov.1962
ENGLISH
ORIGINAL : RUSSIAN

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

SUMMARY

Agenda Item: D

Mongolia

INDUSTRIAL DEVELOPMENT IN THE MONOGOLIAN PEOPLE'S REPUBLIC

By L. GURZHAV

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

INDUSTRIAL DEVELOPMENT IN THE MONGOLIAN PEOPLE'S REPUBLIC

by

L. Gurshav

Before 1921 a natural form of economy combining the existence side by side agriculture and artisanal industry prevailed in Mongolia. Although trade based on currency was only very weakly developed, capital for commerce on the basis of usury nevertheless existed and merchants established a link between our country and the outside world. The output of handycrafts to meet individual orders or for sale on the market was embryonic; there were only handycraftmen's (shoemakers, jewellers, carpenters, shops producing religious articles, etc.) and a limited number of small enterprises working with manual labour and primitive means of production. The valuable mineral deposits which are abundant in our country (coal, iron ore, non-ferrous metals, building materials, etc.) were hardly extracted. Modern factories and plants for the processing of agricultural raw materials did not exist either. In other words, industrial production in its modern sense was absent.

The liquidation of feudal productive relationships and the expulsion of foreign capital based on usury on one hand, and the birth of a socialist sector in the national economy together with the creation of a firm ground work for non-capitalist development on the other hand were the basic elements which determined the creation and growth of mechanized industry in our country.

Availing themselves of their newly-won power, the Mongolian people undertook, with the assistance of the USSR, the creation of the most important prerequisite for non-capitalist development — industrial construction. Several industrial enterprises, erected for the first time on Mongolian soil, were put into operation as early as in the early 1930's; a large industrial combine consisting of several plants in Ulan-Bator, a machine repair factory, and an electric power station. Automobile transport followed by railroads was introduced.

In recent years new deposits of valuable minerals have been discovered. On the basis of the rich national resources of the country, such branches of industry as oil, ore and coal extraction, production of fuel and power, metal processing, wood processing, leather and footwear, paper and pulp, polygraphy, pharamaceuticals, etc. have been created and are developing rapidly. In this connection it is important to emphasise that our young industries are equipped with a most up-to-date technology. The Soviet Union, the Chinese People's Republic, Czechoslovakia, the German Democratic Republic, Hungary and other nations of the Socialist camp rendered and continue to render invaluable technical assistance to the economy of the Mongolian People's Republic, particularly in the introduction of new technology.

The results achieved through the industrialization of Mongolia are well illustrated by the fact that the industrial production over the past ten years has increased nearly fourfold.

The relative importance of group "A" in the overall output of industrial production increased from 25.3% in 1952 to 50.9% in 1960. The production of industrial goods per capita is increasing each year. For example, 3.5 times more electric power was produced per capita in 1959 than in 1952.

As a result of this effort the Mongolian People's Republic, which in the recent past was a backward cattle-breeding country, became an industrial-agrarian State.

The victory of the socialist system of production in the entire economy of this country has given the Mongolian People's Republic the aim of completing the creation of a material and technical basis for socialism. Further industrialisation of the country and intergraded mechanisation of agriculture constitute the basic milestone on the way towards the creation of the material and technical basis of socialism. Today the Mongolian people are enthusiastically beginning to implement the third Five-Year Plan for the development of the national economy (1961-1965). When this plan is fulfilled,

Mongolia will have taken an important step on its way to becoming an industrial-agrarian country.

As a result of the growth of socialist industry, our working class has grown in number and its skill has improved. The number of workers has increased 6.4 times in comparison with the 1940 level. The guiding role of the working class is steadily and inevitably growing. The indivisable bond linking the working class with the cooperative peasantry is constantly made stronger while the political and moral unity of the entire people is reinforced.

Our workers are successfully introducing new modern equipment and progressive productive techniques.

Consequently, the industry of the Mongolian People's Republic is the expression of the broad application of science and technology for the production of goods and services. The electrification of the economy and the all-round utilization of electricity in social and cultural institutions and in the homes of the people provide a vivid testimony of this.

Technological progress, improvement of the organization of production, and the rising cultural and technical level of the workers ensure the systematic growth of labor productivity.

The economic support received from socialist countries was one of the most important conditions that led to the industrialization of our country. Because of extreme economic backwardness, our country would not have been able to cope with the problem of industrial development in such a short period of time without the friendly assistance of the other Socialist countries.

Socialist industry is in fact the most outstanding achievement of the Mongolian people and is the direct result of the policy waged by the People's Government. Our success shows how the huge difficulties that confronted the development of our country have been overcome.

The goals of the Third Five-Year Plan in the field of industry consist in ensuring the priority development of the provision of fuel and energy as a basis for further industrial development through the comprehensive utilisation of our very abundant natural resources.

In 1965 according to the Third Five-Year Plan the entire output of industry will amount to 1,224.5 million tugriks. This means that output will increase twofold by 1965; this includes the most important commodities; for example: hard coal extraction -- 2.2 times, electric power -- 3 times, building materials -- 3.2 times, extraction of rare metal ores -- 2 times, metal processing and maintenance work -- 1.16 times, leather goods and footwear -- 1.6 times, textiles -- 2.2 times, foodstuffs -- 2.2 times. The assortment of industrial goods will be considerably expanded.

This industrial development will be achieved through the construction of new industrial units and the reconstruction of several existing enterprises, and through the improved efficiency of the existing productive forces. Clearly, investments, which are considerable for our country, will be required in order to construct new units and reconstruct existing enterprises.

Investment in industry will amount to 1.85 billion tugriks for the period of the Five-Year Plan or to 39.8% of total investments on a nation-wide basis.

A more rapid rate of development in socialist industrialisation will raise the economy of the Mongolian People's Republic up to the level of the countries of the Socialist camp.

This in turn will make it possible for our country the opportunity to pass over to a communist society more or less simultaneously with the other socialist nations.

S - 1329 E - Nov.1962 - 1,600